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1 IN THE UNITED STATES DISTRICT COURT
2 FOR THE EASTERN DISTRICT OF TEXAS
3 MARSHALL DIVISION
4 VOCALIFE LLC,) (
5 PLAINTIFF,) (CIVIL ACTION NO.
6) (2:19-CV-123-JRG
7 VS.) (MARSHALL, TEXAS
8) (
9 AMAZON.COM, INC. and) (
10 AMAZON.COM LLC,) (OCTOBER 5, 2020
11 DEFENDANTS.) (12:53 P.M.

12 TRANSCRIPT OF JURY TRIAL
13 AFTERNOON SESSION
14 BEFORE THE HONORABLE JUDGE RODNEY GILSTRAP
15 UNITED STATES CHIEF DISTRICT JUDGE
16

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24 (Proceedings recorded by mechanical stenography, transcript
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25

P R O C E E D I N G S

(Jury out.)

COURT SECURITY OFFICER: All rise.

THE COURT: Be seated, please.

Mr. Hadden, are you prepared to continue with your cross-examination?

MR. HADDEN: I am, Your Honor.

THE COURT: You may return to the podium then.

MR. HADDEN: Thank you, Your Honor.

THE COURT: Let's bring in the jury, please, Mr. Johnston.

COURT SECURITY OFFICER: All rise.

(Jury in.)

THE COURT: Please be seated, ladies and gentlemen.

We will continue with the Defendants' cross-examination of Mr. McAlexander.

Mr. Hadden, you may continue.

MR. HADDEN: Thank you, Your Honor.

JOSEPH MCALEXANDER, III, PLAINTIFF'S WITNESS

PREVIOUSLY SWORN

CROSS-EXAMINATION CONTINUED

BY MR. HADDEN:

Q. Good afternoon, Mr. McAlexander.

A. Good afternoon.

12:54:55 1 Q. Where we left off, I think we had agreed that by the
12:54:59 2 time we got done with this process that we've been
12:55:02 3 discussing, what we have shown on this diagram, we haven't
12:55:04 4 yet determined our seven delays because we haven't used the
12:55:08 5 azimuth angle. Isn't that right?

12:55:10 6 A. We have not as of this time used the azimuth portion of
12:55:14 7 that, yes.

12:55:14 8 Q. So, at this point, we have not determined the delays as
12:55:22 9 required by the claim, correct?

12:55:24 10 A. Other than the -- that is correct, other than the
12:55:27 11 fact -- well, I'll save that for direct.

12:55:31 12 Q. Okay.

12:55:32 13 A. Redirect.

12:55:32 14 Q. So now if we look at the output of this process, what
12:55:37 15 we get is one -- we get six beams, right?

12:55:40 16 A. Yes, that's correct.

12:55:41 17 Q. And each of those beams is a combination of the
12:55:45 18 microphone outputs from each of the seven microphones,
12:55:50 19 right?

12:55:50 20 A. The result of being is a result of the -- from the
12:55:53 21 combination of the microphones.

12:55:55 22 Q. Right. And there's no delay that's being output as
12:56:02 23 part of those beams, right?

12:56:06 24 A. There's a delay that's embedded. That's not correct.

12:56:11 25 Q. Okay. So is it your testimony that that beam that is

12:56:15 1 coming out that is a combination of those seven microphones
12:56:18 2 also includes seven delays?

12:56:21 3 A. There are different delays associated with each beam,
12:56:27 4 yes.

12:56:27 5 Q. So is there -- I'm focusing on one beam. So let's take
12:56:32 6 Beam 1.

12:56:35 7 A. Okay.

12:56:35 8 Q. Does the output of Beam 1, does that include seven
12:56:40 9 delays?

12:56:40 10 A. Does the output of Beam 1 include seven delays?

12:56:44 11 Q. Yes, that was the question.

12:56:49 12 A. I don't believe so, no.

12:56:50 13 Q. Okay. Does the output of any of those six beams
12:56:54 14 include seven delays?

12:56:56 15 A. No.

12:57:03 16 Q. Does --

12:57:04 17 MR. HADDEN: Let's go back to -- the Doppler
12:57:06 18 figure, please.

12:57:07 19 Q. (By Mr. Hadden) So going back to this figure and
12:57:17 20 reorienting, what we sort of ended with with the fixed
12:57:21 21 beamformer calculation we did to correspond in this diagram
12:57:24 22 to the output of the fixed beamformer block, right?

12:57:27 23 A. That is what we were focusing on, yes.

12:57:30 24 Q. And the No. 6 there that's coming out, that represents
12:57:33 25 those six beams, right?

12:57:35 1 A. Yes, that's correct.

12:57:36 2 Q. And each of those beams, again, represent a combination
12:57:41 3 of all seven microphones, right?

12:57:42 4 A. That is correct.

12:57:47 5 Q. And none of those beams included seven delays, right?

12:57:54 6 A. You asked me, does each beam include seven delays?

12:57:59 7 Q. Correct.

12:58:00 8 A. No.

12:58:01 9 Q. Okay. And then we pass through this acoustic echo
12:58:06 10 canceler, and you're not contending that the determining
12:58:10 11 the delays is performed by the acoustic echo canceler, are
12:58:14 12 you?

12:58:15 13 A. No, that's noise abatement.

12:58:17 14 Q. Okay. So the only thing left is the main beam
12:58:21 15 selector. So is it your testimony that the main beam
12:58:24 16 selector calculates the seven delays?

12:58:26 17 A. Again, I'm not sure what you mean by the seven delays.
12:58:26 18 You've indicated that for each beam, and that doesn't make
12:58:31 19 sense.

12:58:31 20 Q. Well, according to the claim, we need one delay for
12:58:34 21 each sound sensor, right? And we have seven microphones,
12:58:39 22 right?

12:58:39 23 A. Yeah, one delay for each, but your question has always
12:58:42 24 been seven for each, which didn't make sense.

12:58:46 25 Q. To be clear, the claim requires one delay for each

12:58:53 1 microphone, correct, Mr. McAlexander?

12:58:54 2 A. That is correct.

12:58:55 3 Q. And we have seven microphones in the example we've been
12:58:58 4 talking about, right?

12:58:59 5 A. That is correct.

12:59:00 6 Q. So, ultimately, you need to show that we have
12:59:02 7 calculated or determined seven delays?

12:59:09 8 A. One -- one for each microphone, yes.

12:59:11 9 Q. Okay. So the question was, does the input to the main
12:59:17 10 beam selector include seven delays, one for each
12:59:24 11 microphone?

12:59:25 12 A. The input to the beamformer; is that what your question
12:59:27 13 was?

12:59:28 14 Q. No, the main beam selector.

12:59:30 15 A. Oh.

12:59:30 16 Q. We've got the main beam selector. So we're input to
12:59:34 17 the main beam selector. Does that input include seven
12:59:38 18 delays, one for each microphone?

12:59:40 19 A. Yes, delays are already built in by the time it gets to
12:59:46 20 the main beam selector.

12:59:47 21 Q. Well, you just told me we haven't determined the delays
12:59:52 22 in the fixed beamformer, we didn't calculate the delays in
12:59:56 23 the acoustic echo canceler. So where do the delays get
01:00:02 24 built in?

01:00:02 25 A. It's all part of the fixed beamformer with the adaptive

01:00:03 1 beamformer wraparound. Again, you only showed me part of
01:00:04 2 it, but it's done by the time it gets to the main beam
01:00:08 3 selector.

01:00:10 4 Q. So going back now. So you're saying that we've left
01:00:15 5 the fixed beamformer block with our six beams. Are you now
01:00:20 6 telling the jury that the delays have all been determined
01:00:23 7 at that point?

01:00:23 8 A. At the point in time it gets to the main beam selector,
01:00:28 9 yes.

01:00:29 10 Q. And where did the azimuth angle get added to that
01:00:31 11 determination calculation?

01:00:34 12 A. Two parts. Part 1 is that the MATLAB has already
01:00:39 13 created weighting factors based upon a number of factors,
01:00:45 14 including azimuth. It's already built into the beam
01:00:50 15 finder -- beamformer.

01:00:51 16 Number two, each one of the microphones is
01:00:55 17 receiving the incident target signal at a different time,
01:00:59 18 and so the sampling that is done by each of those
01:01:02 19 microphones is going to have a different value that is
01:01:04 20 going to be instantiated as the sample input. So you're
01:01:08 21 going to have a delay built in based upon the microphone
01:01:12 22 input.

01:01:12 23 Q. But we've already -- already used the MATLAB
01:01:17 24 coefficients in that fixed beamformer process that we went
01:01:21 25 through, and you testified that that did not use the

01:01:24 1 azimuth angle and that we had not determined the delays at
01:01:27 2 that point. So are you testifying differently now?
01:01:30 3 A. No, I'm testifying the same, but you never asked about
01:01:33 4 the input. The input sampling is different for each
01:01:36 5 microphone.

01:01:36 6 Q. So where are we determining the delay using the azimuth
01:01:52 7 angle if it's not in the fixed beamformer block?

01:01:55 8 A. Again, you did not include the sample input. It's a
01:01:58 9 part of the fixed beamformer block because the sample end
01:02:04 10 is different for each microphone. And so, therefore, the
01:02:05 11 delay is built in based upon the azimuth signal that is
01:02:09 12 being received.

01:02:09 13 Q. So your testimony is that the code never actually uses
01:02:14 14 an azimuth angle; is that your testimony?

01:02:19 15 A. The weighting factors for each of the beam -- beams
01:02:22 16 already have azimuth built in as part of the factors.

01:02:25 17 Q. Well, that's not correct, is it, Mr. McAlexander,
01:02:28 18 because the weighting factors were determined in the
01:02:35 19 laboratory before any target sound signal had been received
01:02:39 20 by the device?

01:02:39 21 A. That is consistent with my testimony. MATLAB has
01:02:45 22 determined the entire universe of the potential azimuth
01:02:48 23 indicators, and so the weighting factors are in part built
01:02:52 24 on that, and that's already preloaded into the device. So
01:02:55 25 when the determining takes place, that's when the incident

01:02:59 1 target signal arrives.

01:03:00 2 Q. So it's your testimony that the fixed beamformer does
01:03:07 3 calculate the delay and does use the azimuth angle because
01:03:10 4 somehow that is a -- an aftereffect of receiving a beam on
01:03:20 5 a microphone; is that your testimony?

01:03:21 6 A. I did not use the word calculate, nor is the word
01:03:24 7 calculate in the claim. It's -- the claim requires
01:03:27 8 determining and based upon, and determining -- excuse me --
01:03:33 9 determining a delay, and one of those is the azimuth.

01:03:35 10 What I'm saying is the incident beam, the target
01:03:39 11 signal that's coming in is going to be received differently
01:03:42 12 on a delay basis of each microphone. So when you sample
01:03:45 13 that input, you're going to have different information as
01:03:48 14 an input to the beamformer.

01:03:50 15 And so that -- that, in combination with the
01:03:56 16 weights that the beamformer uses, will provide a -- an
01:03:59 17 output that includes consideration of the azimuth.

01:04:02 18 Q. So in your testimony now, your testimony is that these
01:04:09 19 seven delays have been determined after the fixed beams
01:04:14 20 have been formed and have left the fixed beamformer and
01:04:18 21 before the main beam selector does anything. Is that your
01:04:24 22 testimony?

01:04:24 23 A. That is before -- the main beam selector is going to
01:04:28 24 actually do the selection of the beam that has the highest
01:04:31 25 out of the noise signal-to-noise ratio. That's what's done

01:04:36 1 by the main beam selector.

01:04:39 2 Q. And have you identified anything in the fixed
01:04:44 3 beamformer, the SDB code that uses an azimuth angle?

01:04:51 4 A. I believe that is in the code that I've already
01:04:56 5 described, and it was also, as I recall in the deposition
01:05:00 6 testimony, it was agreed to by a 30(b)(6) witness at Amazon
01:05:04 7 that azimuth is included in the beamfinder.

01:05:06 8 Q. I'm not talking to you about the MATLAB code. I'm
01:05:08 9 talking to you about the code that is actually running on
01:05:10 10 the Echo device.

01:05:11 11 A. That is what --

01:05:12 12 Q. The beamformer code --

01:05:13 13 THE COURT: Just a minute, gentlemen. We're going
01:05:15 14 to talk one at a time here, all right? Make sure the
01:05:17 15 question has been asked before you answer, and make sure
01:05:19 16 the answer has been given before you go to the next
01:05:21 17 question.

01:05:22 18 MR. HADDEN: Yes, Your Honor.

01:05:24 19 THE WITNESS: Yes, Your Honor.

01:05:25 20 Q. (By Mr. Hadden) So just focusing on the code that is
01:05:27 21 actually running on the Echo device, did you show any code
01:05:30 22 to the jury today that includes a determination that uses
01:05:35 23 an azimuth angle?

01:05:38 24 A. The code that is -- the answer is, yes, because the
01:05:42 25 code is embedded in the -- from the MATLAB code and the

01:05:47 1 weighting factors.

01:05:48 2 Q. So the question again, is there any variable or output
01:05:57 3 or any other artifact in any code that you've shown the
01:06:04 4 jury today that includes or uses an azimuth angle of the --
01:06:13 5 to the target source that is received by the device when
01:06:16 6 it's in operation, not when it's being simulated in the
01:06:20 7 lab?

01:06:21 8 A. Well, I provided input that the MATLAB does all the
01:06:42 9 cal -- performs the calculations for providing that, but
01:06:45 10 that is then loaded on the -- or programmed in on the
01:06:49 11 device, and so the device is going to operate based upon
01:06:51 12 what is programmed in, not based on MATLAB.

01:06:55 13 Q. So the --

01:07:00 14 A. So I did show that.

01:07:01 15 Q. So, again, you're saying that the azimuth angle is
01:07:03 16 somehow in the coefficients that were generated in the lab
01:07:08 17 before the device received any target sound signal from a
01:07:16 18 target source? Is that your testimony?

01:07:19 19 A. All of the -- yes, all the combinations are in the
01:07:22 20 MATLAB, and then they are embedded in the device, and the
01:07:26 21 device calls on that code based upon an incoming signal at
01:07:35 22 an azimuth.

01:07:35 23 Q. So there's nothing you have found in any of your review
01:07:43 24 of the Echo source code that actually performs the
01:07:43 25 calculation using an actual azimuth angle and is

01:07:43 1 received -- that is -- corresponds to a target sound signal
01:07:49 2 that is actually received by the device when it's in
01:07:52 3 operation, right?

01:07:54 4 A. Incorrect. I've just indicated the answer to that.

01:07:59 5 MR. HADDEN: Let me -- can we see Plaintiff's
01:08:02 6 1377, please, Mr. Berk?

01:08:04 7 Q. (By Mr. Hadden) Now, this is one of the exhibits you
01:08:17 8 discussed with Vocalife's counsel, isn't it,
01:08:20 9 Mr. McAlexander?

01:08:20 10 A. Yes, that's correct.

01:08:21 11 Q. And you showed a few times this Page 60.

01:08:24 12 MR. HADDEN: Could we see Page 60, Mr. Berk?

01:08:27 13 Q. (By Mr. Hadden) This figure, do you recall this?

01:08:32 14 A. Yes, I do.

01:08:36 15 MR. HADDEN: Now, if we go back to the second
01:08:40 16 page, please, Mr. Berk.

01:08:42 17 Q. (By Mr. Hadden) This Mr. Grizzel, he is not an
01:08:47 18 engineer that works on Echos, is he, Mr. McAlexander?

01:08:51 19 A. I can rep -- only represent it's Principal Solutions
01:08:57 20 Architect, Alexa Voice Service --

01:08:58 21 Q. Uh-huh.

01:08:59 22 A. -- that's what it represents.

01:09:01 23 Q. In fact, this whole presentation doesn't have anything
01:09:03 24 to do with Echos, does it, Mr. McAlexander?

01:09:07 25 A. It's a document that's produced by Amazon that is with

01:09:19 1 regard to the Alexa voice technology.

01:09:20 2 Q. Well, this presentation is actually about a kit that
01:09:27 3 Amazon provides to third-party manufacturers so they can
01:09:31 4 build their own devices that can communicate with Alexa;
01:09:39 5 isn't that right, Mr. McAlexander?

01:09:41 6 A. That is correct.

01:09:41 7 Q. Okay. And so the hardware and the algorithms that are
01:09:44 8 described here are not the hardware and algorithms that are
01:09:48 9 in the accused Echo products; these are products that other
01:09:51 10 companies would build. Right?

01:09:52 11 A. These are products that other companies would build in
01:09:56 12 conformance with the Alexa application, which means it
01:10:00 13 would correspond with what is in the actual Amazon product.

01:10:04 14 Q. Well, these are devices that third-party companies can
01:10:07 15 build so that they can communicate with Alexa, but those
01:10:11 16 third parties design their own products. Right?

01:10:14 17 A. Yes, they do. They have to do it in conformance with
01:10:17 18 the guidelines that are provided by Amazon to be certified
01:10:21 19 by Amazon.

01:10:22 20 Q. Right. The developers of those products can choose
01:10:26 21 their own audio front end technology to use, right?

01:10:29 22 A. Yes, they can design their own audio front end. Again,
01:10:34 23 it has to be consistent with the requirements for Echo if
01:10:38 24 they are going to be responsive with the Alexa code.

01:10:43 25 MR. HADDEN: Well, if we look at -- if we look at,

01:10:46 1 Mr. Berk, I guess it'd be four pages from the end with the
01:10:53 2 heading My Recommendations? Do you see that?
01:10:57 3 Q. (By Mr. Hadden) So this is part of the presentation,
01:11:01 4 and the Amazon engineer that works on this kit and not Echo
01:11:05 5 is telling the audience that they should build something
01:11:09 6 unique.

01:11:09 7 Do you see that?

01:11:11 8 A. Sure.

01:11:11 9 Q. And they say: Seven mics may not be necessary --
01:11:17 10 aligned to the anticipated use kit.

01:11:20 11 Do you see that?

01:11:21 12 A. Yes. It means you can use more than -- different --
01:11:24 13 different combinations than the seven mics.

01:11:27 14 Q. And if you look at the second to last page, it says:
01:11:30 15 What will you create?

01:11:32 16 So this is talking to potential developers of
01:11:34 17 other products about products that they can build, not
01:11:38 18 about the Echo product that Amazon built. Isn't that
01:11:44 19 right, Mr. McAlexander?

01:11:44 20 A. Yes, that's correct.

01:11:46 21 Q. Okay.

01:11:47 22 MR. HADDEN: No further questions.

01:11:48 23 THE COURT: You pass the witness, counsel?

01:11:49 24 Mr. Hadden, you pass the witness?

01:11:51 25 MR. HADDEN: I pass the witness. Sorry,

01:11:54 1 Your Honor.

01:11:54 2 THE COURT: Mr. Rubino, are you going to use this
01:11:57 3 chart during your redirect?

01:11:59 4 MR. RUBINO: Yes, Your Honor, briefly.

01:12:01 5 THE COURT: All right. We'll leave it up then.
01:12:05 6 You may proceed with redirect.

01:12:05 7 REDIRECT EXAMINATION

01:12:15 8 BY MR. RUBINO:

01:12:15 9 Q. Good afternoon, Mr. McAlexander.

01:12:17 10 A. Good afternoon.

01:12:17 11 Q. This board that is in front of us here, is this the --
01:12:20 12 is this the full delay limitation?

01:12:23 13 A. No. I mean, this is just a -- a recitation of a part
01:12:32 14 of the claim.

01:12:33 15 Q. So it's not even the full delay limitation?

01:12:36 16 A. No.

01:12:37 17 MR. RUBINO: We can take it down now.

01:12:48 18 If we could please call up Plaintiff's 1. If we
01:12:53 19 can go to Figure 1, second page, please. There we go.

01:13:00 20 Q. (By Mr. Rubino) Mr. McAlexander, do you recall being
01:13:03 21 asked about this figure?

01:13:04 22 A. Yes, I do.

01:13:06 23 Q. And you were asked about certain steps and when they
01:13:10 24 occur in this figure; do you recall that?

01:13:12 25 A. Yes, I do.

01:13:14 1 Q. What is this figure, sir?

01:13:16 2 A. Figure 1 is stated in the specification -- excuse me,
01:13:24 3 stated in the specification as being: Illustrates a method
01:13:35 4 for enhancing a target sound signal from multiple sound
01:13:40 5 signals.

01:13:41 6 So it is an illustration of a way in which it can
01:13:44 7 be done. It's not the only way. It's an illustration.

01:13:46 8 Q. Is this the claim, sir?

01:13:47 9 A. No, it's not.

01:13:48 10 Q. And, earlier, in the context of that delay limitation,
01:13:58 11 do you recall being asked about certain outputs of -- of
01:14:04 12 calculations -- the word "output"; do you recall that word?

01:14:12 13 A. I recall that word, yes.

01:14:14 14 Q. Now, does -- does the claim require an output?

01:14:16 15 A. No, it doesn't require an output.

01:14:19 16 Q. What does the determination limitation require?

01:14:22 17 MR. RUBINO: And if we could put up Plaintiff's 1
01:14:26 18 at Claim 1, please, Mr. Thompson.

01:14:48 19 THE WITNESS: Can we enlarge the determining step
01:14:52 20 section? I think it will be easier for the jury to see.

01:14:57 21 A. All right. Repeat your question, please.

01:15:01 22 Q. (By Mr. Rubino) So what does this limitation require
01:15:03 23 if not output?

01:15:03 24 A. Well, the determining a delay, it's a step. And this
01:15:09 25 step says that it's determining a delay between each of

01:15:14 1 said sound sensors and an origin of said array. And --
01:15:18 2 excuse me, it said an origin of said array of sound
01:15:22 3 sensors.

01:15:22 4 And let me just repeat it: Determine a delay
01:15:24 5 between each of said sound sensors and an origin of said
01:15:27 6 array of sound sensors as a function of distance between
01:15:29 7 each of the sound sensors.

01:15:31 8 And I showed that already because the MATLAB
01:15:35 9 calculations basic -- basically determine -- based on an
01:15:40 10 architectural arrangement or a layout of the sound sensors
01:15:45 11 or microphones, they know -- that architectural layout
01:15:48 12 knows what the distance is. So that calculation is already
01:15:52 13 built into the coefficients that are then programmed into
01:15:54 14 this device.

01:15:57 15 Q. And, earlier, again, counsel for Amazon asked you about
01:16:01 16 the location of incoming sound signals. Do you recall
01:16:05 17 that?

01:16:06 18 A. Yes.

01:16:06 19 Q. Is there another limitation in this claim about
01:16:10 20 location of incoming sound signals?

01:16:12 21 A. Well, there's one -- the azimuth angle between said
01:16:19 22 reference axis and the -- and the target sound signal. So
01:16:21 23 the incoming sound signal is the target sound signal.

01:16:25 24 Q. And what about the next limitation of the claim?

01:16:27 25 A. The next limitation states: When said target sound

01:16:31 1 source that emits said target sound signal is in a
01:16:37 2 two-dimensional plane.

01:16:38 3 Q. And how about the -- the final limitation or the second
01:16:41 4 to last limitation after -- after the determining
01:16:50 5 limitation?

01:16:50 6 MR. RUBINO: If we can move up the figure, please.
01:16:56 7 Thank you.

01:16:56 8 A. Are you talking about the estimating?

01:16:59 9 Q. (By Mr. Rubino) Yes, sir.

01:17:00 10 A. Okay. The next -- the other step that's required is:
01:17:04 11 Estimating a spatial location of said target sound signal
01:17:07 12 from said received sound signals by said sound source
01:17:07 13 localization unit.

01:17:16 14 Built into this is a delay component because the
01:17:20 15 target sound signal, as I showed earlier, is going to
01:17:23 16 arrive at each microphone differently at a different time.

01:17:25 17 And based upon the sampling at 16,000 cycles per
01:17:28 18 second, based upon the sampling that's taken from that same
01:17:33 19 signal arriving at different microphones, the input, the
01:17:37 20 value that's in those samples is going to be different for
01:17:39 21 each microphone.

01:17:41 22 So, therefore, there's a different input to each
01:17:44 23 one of the beamformers based upon the signal that comes in.
01:17:49 24 It's going -- if it comes in off azimuth to a microphone,
01:17:55 25 then the value that's going to be associated by that

01:17:56 1 microphone is going to be different. So there's a
01:17:58 2 differentiation or a built-in based upon azimuth to the
01:18:03 3 signal based upon the input to the beamformer.

01:18:06 4 Q. Sir, in the context of the Amazon document you reviewed
01:18:11 5 earlier in -- and that counsel for Amazon had showed you,
01:18:17 6 did you see the word "fixed beamformer" in there?

01:18:21 7 A. In this -- you're talking about the Defendants'
01:18:27 8 Exhibit 319?

01:18:38 9 Q. Yes, sir.

01:18:39 10 A. Paragraph 5 -- Section 5, excuse me, was entitled Fixed
01:18:46 11 Beamformer.

01:18:46 12 Q. So your testimony is there's a fixed beamformer in
01:18:49 13 here?

01:18:49 14 A. I'm sorry. I thought you were talking about -- yeah,
01:18:52 15 319? Yes.

01:18:54 16 Q. Yes.

01:18:54 17 A. Section 5.

01:18:56 18 MR. RUBINO: If we could actually go back a slide.
01:19:00 19 Sorry, go back a page. The front of that document, please.
01:19:04 20 Can we blow up Figure 1?

01:19:07 21 A. Just to make -- and I want to make sure I'm on track
01:19:11 22 with you because you've got Plaintiff's Exhibit 319. What
01:19:15 23 was put up was Defendants' Exhibit 319.

01:19:18 24 Q. (By Mr. Rubino) That was okay. Plaintiff's --

01:19:22 25 A. Just want to make sure I'm looking at the right one.

01:19:25 1 MR. RUBINO: This one is just fine. Thank you.

01:19:28 2 Q. (By Mr. Rubino) So for Plaintiff's Exhibit 319, do you
01:19:30 3 see the top of this page?

01:19:31 4 A. Yes, I do.

01:19:32 5 Q. And that does say "fixed beamformer," right?

01:19:35 6 A. That is correct, yes.

01:19:36 7 Q. And that's the Echo on the left?

01:19:37 8 A. That is correct.

01:19:40 9 MR. RUBINO: I'd like to take up Plaintiff's 1,
01:19:45 10 please, and please go to Figure 4, Mr. Thompson. Thank
01:19:50 11 you.

01:19:52 12 Q. (By Mr. Rubino) Do you recall earlier yesterday -- or
01:19:56 13 earlier on Friday when Dr. Zhu was being questioned about
01:20:02 14 this figure? Do you recall that?

01:20:04 15 A. Yes, I do.

01:20:05 16 Q. And do you recall when there were questions about
01:20:11 17 incoming target sound signals and azimuths and delays, in
01:20:17 18 this figure?

01:20:18 19 A. Yes, I do.

01:20:18 20 Q. Can you tell me what this figure represents in the
01:20:21 21 context of the '049 patent?

01:20:24 22 A. Yes. Figure 3 -- Figure 4, excuse me, represents the
01:20:31 23 algorithm used in this case, a delay-and-sum algorithm.

01:20:38 24 It's built into this Fast Fourier Transform domain. And
01:20:44 25 what you will notice at the top of Figure 4 is the target

01:20:50 1 sound signal is coming in at some azimuth, some angle. And
01:20:55 2 the angle that it comes in to each microphone is going to
01:20:59 3 be somewhat different.

01:21:00 4 And so that means that the -- when it does hit the
01:21:04 5 particular microphone that's arranged, for instance, in a
01:21:09 6 circular -- circular array, it's going to hit each
01:21:12 7 microphone at a different time. So there's a built-in
01:21:16 8 delay in terms of that signal.

01:21:17 9 So the actual pickup from the microphones is not
01:21:20 10 going to be exactly the same. Each microphone is going to
01:21:23 11 pick up the signal slightly differently. And so,
01:21:27 12 therefore, the inputs from M_0 to M_{N-1} are going to be
01:21:27 13 different to each one of the -- the X components.

01:21:39 14 And so that input already has built-in differences
01:21:41 15 based upon the azimuths of the incoming signal. That is
01:21:45 16 going to be an input into the Fast Fourier Transform doing
01:21:49 17 a delay-and-sum or filter-and-sum type technique, and the
01:21:55 18 output of that is going to provide the -- an estimate of
01:21:57 19 the delay.

01:21:58 20 Q. And Amazon uses filter-and-sum beamformer?

01:22:03 21 A. That is correct.

01:22:05 22 MR. RUBINO: No further questions.

01:22:06 23 THE COURT: You pass the witness, counsel?

01:22:08 24 MR. RUBINO: Yes.

01:22:09 25 THE COURT: Is there further cross-examination?

01:22:13 1 MR. HADDEN: No, Your Honor.

01:22:14 2 THE COURT: Then you may step down,
01:22:16 3 Mr. McAlexander.

01:22:17 4 THE WITNESS: Thank you, sir.

01:22:18 5 THE COURT: Plaintiff, call your next witness.

01:22:21 6 MR. FABRICANT: Your Honor, our next witness is by
01:22:24 7 video from deposition testimony. Ms. Park will announce
01:22:30 8 the witness, Your Honor.

01:22:31 9 THE COURT: All right.

01:22:31 10 MS. PARK: Amy Park for Plaintiff, Your Honor.

01:22:43 11 Plaintiff calls by deposition Wai Chu, engineer at
01:22:43 12 Amazon's Lab126. Playing time for Plaintiff is 12 minutes,
01:22:50 13 41 seconds; and for Defendants, 29 seconds.

01:22:50 14 THE COURT: Proceed with this witness by
01:22:52 15 deposition.

01:22:52 16 WAI CHU, PLAINTIFF'S WITNESS

01:22:53 17 PRESENTED BY VIDEO DEPOSITION

01:22:53 18 (Videoclip played.)

01:22:54 19 Q. Okay. Mr. Wu, can you please state your name for the
01:23:04 20 record?

01:23:04 21 A. Sure. My name is Jerry Wu --

01:23:10 22 (Videoclip stops.)

01:23:10 23 MR. FABRICANT: Apologize, Your Honor. It was the
01:23:12 24 wrong video.

01:23:14 25 THE COURT: Well, let's play the right video.

01:23:16 1 MR. FABRICANT: Yes, sir.

01:23:16 2 (Videoclip played.)

01:23:28 3 Q. Can you please state your full name for the record?

01:23:29 4 A. My first name is W-a-i, Wai. My last name is C-h-u.

01:23:35 5 Q. Mr. Chu, for whom do you currently work?

01:23:39 6 A. Amazon Lab126.

01:23:40 7 Q. How long have you worked for Amazon?

01:23:42 8 A. I started in November 2010.

01:23:45 9 Q. Have you heard of a company called Bell Labs?

01:23:49 10 A. Bell Labs, of course, in New Jersey, right? Yeah, of
01:23:54 11 course.

01:23:54 12 Q. But when you heard of them, you thought -- you would
01:23:58 13 have held them in high regard, right?

01:24:00 14 A. It's highly respected because there have -- there have
01:24:04 15 been some Nobel Prize, right, and there are very good
01:24:07 16 people there.

01:24:07 17 Q. Can you tell me which Echo products you've worked on?

01:24:10 18 A. Well, I started with the Doppler, though I -- I started
01:24:17 19 with the Doppler. It was back in 20 -- 2011. Some time
01:24:23 20 toward mid- to late 2011, I started with the Doppler.

01:24:26 21 Later, it was the Pancake, and -- and then several
01:24:31 22 others. Internally, it's called Knights and Radar and
01:24:36 23 Sonar. On the outside, you have different Echo names. I
01:24:42 24 don't even -- it's -- I don't know which one is which on
01:24:45 25 the outside, but internally, we have a code name.

01:24:49 1 So I worked on all these devices and -- and -- but
01:24:55 2 at first, I defined the -- the software architecture, which
01:24:58 3 is used by all devices, pretty much.

01:25:02 4 Q. Are you familiar with a term of a microphone array?

01:25:08 5 A. Yes. In the original Doppler, we have seven mics on
01:25:19 6 the top.

01:25:21 7 Q. And had that number of microphones changed throughout
01:25:28 8 the course of these products?

01:25:31 9 A. Yes. So we have between eight mics to two mics.

01:25:38 10 Q. And earlier today, before, we discussed that Version 3
01:25:43 11 of the Echo Dot, you had mentioned that you were involved
01:25:47 12 in developing software and algorithms for audio processing
01:25:51 13 for all versions of the Amazon Echo product; is that right?

01:25:54 14 A. Yes.

01:25:55 15 Q. What is your understanding of what audio front end
01:26:05 16 means?

01:26:05 17 A. We call audio front end the framework that we use to
01:26:14 18 encapsulate the whole audio processing system that is being
01:26:18 19 used at the device.

01:26:20 20 Q. The way the Echo products work, you can talk to them,
01:26:30 21 and based on voice activity, they do something, right?

01:26:33 22 A. That's right.

01:26:36 23 Q. And so when you give it a wake word, for example, if
01:26:42 24 you say "Alexa," the device will respond in some way,
01:26:51 25 correct?

01:26:51 1 A. Yeah, that's how it is designed to do.

01:26:54 2 Q. And so when you say the word "Alexa," the microphones
01:27:00 3 have to receive audio with that word in it, right?

01:27:08 4 A. Yes.

01:27:10 5 Q. So is it fair to say, then, that the audio front end
01:27:13 6 cleans up the signal to feed it into either the wake word
01:27:19 7 detection or the speech recognition engine?

01:27:22 8 A. Yes, or sometimes we call that enhancement, internal
01:27:30 9 cleaning, right.

01:27:31 10 Q. So it's fair to say that the audio front end enhances
01:27:39 11 the signal -- the speech signal before it is fed into
01:27:43 12 either the wake word detection or speech recognition
01:27:47 13 engine, correct?

01:27:48 14 A. Yes.

01:27:48 15 Q. So it's fair to say that with your contribution, you
01:27:53 16 developed a -- a framework, the AFE framework that was able
01:28:02 17 to work with microphone arrays of arbitrary size and
01:28:14 18 number, right?

01:28:19 19 A. Yes.

01:28:20 20 Q. And for one specific Echo product, the Doppler, for
01:28:26 21 example, are there ever updates to the software for the
01:28:33 22 audio front end?

01:28:34 23 A. Yes.

01:28:36 24 Q. Does Amazon release those software updates to devices
01:28:43 25 that are owned by its customers, the end users?

01:28:48 1 A. Yes.

01:28:54 2 Q. Is that done over-the-air, or OTA?

01:29:03 3 A. Yes.

01:29:03 4 Q. Some time in 2015, the audio front end was reconfigured

01:29:12 5 and called the MPAF, right?

01:29:20 6 A. That's right. But it is still an AFE, but we just call

01:29:24 7 it the MPAF, yeah.

01:29:26 8 Q. And so does the MPAF run on all devices now, including

01:29:31 9 the older Doppler device?

01:29:34 10 A. No. So on the older Doppler -- Doppler and Pancake

01:29:42 11 software, they still use the old framework, but all the --

01:29:46 12 all the devices after that use the -- the new framework.

01:29:50 13 Q. Does the MPAF have a beam selector unit?

01:29:55 14 A. Yes.

01:29:59 15 Q. Is there a beam selector in the Doppler AFE?

01:30:03 16 A. There is a beam selector in the Doppler AFE, yes.

01:30:09 17 Q. And there's also a beam selector in the MPAF, right?

01:30:13 18 A. Yes.

01:30:16 19 Q. Do you know one way or the other whether anyone ever

01:30:21 20 calculated the distances between the microphones for any

01:30:28 21 Echo product?

01:30:29 22 A. Yes. So for some algorithms, you need to know the

01:30:34 23 distance of the mics.

01:30:36 24 Q. And that would have been calculated as part of a

01:30:38 25 configuration file, right?

01:30:39 1 A. Well, either you put the distance as a number in the
01:30:42 2 configuration file, or you can also store the coordinates
01:30:46 3 of the microphones, and then, internally, you can compute
01:30:51 4 that distance by knowing the coordinates.

01:30:54 5 Q. How about the angles between the microphones? Let me
01:31:01 6 ask you a different question. You're aware that with
01:31:06 7 regard to the seven microphone products, that there are six
01:31:17 8 microphones along the periphery of the Echo device, right?

01:31:21 9 A. Yes.

01:31:28 10 Q. You're also aware that those microphones are 60 degrees
01:31:31 11 apart, right?

01:31:32 12 A. 60 degrees -- yes, yes.

01:31:41 13 Q. And so that information about 60 degrees apart for the
01:31:45 14 microphones, do you know whether that was ever calculated
01:31:49 15 as part of the software?

01:31:52 16 A. That, I don't know.

01:31:56 17 Q. Do you know whether that was included in any
01:31:59 18 configuration files? And just to be clear, I'm asking you
01:32:03 19 whether the angle was included in any configuration file?

01:32:07 20 A. I don't know. That, I don't know.

01:32:08 21 Q. Do you know whether noise reduction is part of the
01:32:15 22 audio front end with the -- for the Echo products?

01:32:20 23 A. Noise reject -- did you say rejection?

01:32:24 24 Q. Reduction.

01:32:25 25 A. Oh, okay. Yeah, noise reduction, yes. We -- we do

01:32:29 1 have noise reduction. We do have noise reduction, yes.

01:32:33 2 Q. And earlier, we had discussed a block called analysis
01:32:42 3 filterbank or the MPAF. Do you recall that?

01:32:45 4 A. Yes.

01:32:49 5 Q. Are you able to describe how the analysis filterbank
01:32:53 6 works?

01:32:53 7 A. So the analysis filterbank was designed by Amit, but
01:32:59 8 basically, it is mapping the signal samples and time domain
01:33:03 9 to the band domain. So it's kind of a time-to-frequency
01:33:03 10 type of transformation.

01:33:12 11 Q. When you do a -- a conversion from the time domain to
01:33:15 12 the frequency domain, you have to sample it, right?

01:33:19 13 A. Time domain to frequency domain, you -- you process on
01:33:34 14 a frame-by-frame basis. So each frame has a number of
01:33:37 15 samples, right. Yeah.

01:33:39 16 So, for example, you take a 128-sample time frame,
01:33:44 17 and that is going to be mapped to the frequency domain with
01:33:46 18 a -- you know, a similar number of coefficients or samples,
01:33:57 19 right.

01:33:57 20 Q. And when you say 128 in the time domain, you're
01:34:01 21 referring to hertz or kilohertz?

01:34:08 22 A. I meant the number of samples. So -- so if you're
01:34:10 23 sampling a 16 kilohertz, for example, then you have one
01:34:14 24 sample every 1 over 16,000 second, right.

01:34:19 25 Q. And so in the example of the seven-microphone array

01:34:29 1 with six beams -- six beams, your look-direction would be
01:34:34 2 0, 60, 120, 180, 240, 300, and then 0 again, right?
01:34:46 3 A. Yeah. So it's going to be, yeah, 60-degree increments.
01:34:49 4 Q. But that's not what I'm asking you. In the output of
01:34:54 5 the beam selector, it has the ability to change the beam
01:34:57 6 based on differences in SNR, right?
01:35:00 7 A. Yes.
01:35:01 8 Q. Other than to -- let me ask you a different question.
01:35:14 9 So it does not stay on the same beam no matter
01:35:20 10 what, right? It has the ability to change, correct?
01:35:24 11 A. It does have the ability to change, of course.
01:35:26 12 Q. And that change would be a change in direction, right?
01:35:30 13 A. Yeah, changing the beam means changing direction, yes.
01:35:35 14 Q. So, among other things, the MediaTek and Texas
01:35:40 15 Instruments processors run the AFE and MPAF software,
01:35:49 16 right?
01:35:49 17 ATTORNEY: Objection to form.
01:35:50 18 A. Right.
01:35:51 19 Q. And within that MPAF or AFE software, you have code
01:35:55 20 that processes digital signals, right?
01:36:00 21 A. Yes.
01:36:02 22 Q. And that's code that you specially designed for this
01:36:08 23 system, right?
01:36:08 24 A. The purpose is audio signal processing.
01:36:10 25 Q. And it's fair to say that within that audio signal

01:36:14 1 processing, there are mathematical calculations, right?

01:36:19 2 A. Yes.

01:36:20 3 Q. Okay. So you would say that each of the microphones

01:36:30 4 for any given microphone array of the Echo product has

01:36:33 5 coefficients associated with it for beamforming, correct?

01:36:37 6 A. Yes.

01:36:40 7 (Videoclip ends.)

01:36:42 8 THE COURT: Does that complete this witness by

01:36:44 9 deposition?

01:36:44 10 MR. FABRICANT: Yes, it does, Your Honor.

01:36:46 11 THE COURT: Call your next witness, Plaintiff.

01:36:48 12 MR. FABRICANT: Yes, Your Honor. Ms. Park will

01:36:49 13 announce the next witness.

01:36:51 14 MS. PARK: Plaintiff calls by deposition Carlo

01:36:58 15 Murgia, senior manager of audio algorithms and software

01:37:02 16 development at Amazon's Lab126.

01:37:05 17 Playing time for Plaintiff is 11 minutes, 54

01:37:08 18 seconds; playing time for Defendants is 19 seconds.

01:37:16 19 THE COURT: Please proceed with this witness by

01:37:18 20 deposition.

01:37:18 21 CARLO MURGIA, PLAINTIFF'S WITNESS

01:37:19 22 PRESENTED BY VIDEO DEPOSITION

01:37:19 23 (Videoclip played.)

01:37:19 24 Q. Good morning, sir. Can you please state your full name

01:37:23 25 for the record?

01:37:24 1 A. Good morning. My name is Carlo Murgia.

01:37:26 2 Q. Mr. Murgia, where do you currently work?

01:37:29 3 A. I work at Amazon.

01:37:31 4 Q. What is your current job role?

01:37:33 5 A. I'm a senior manager of audio algorithm and software
01:37:38 6 development.

01:37:38 7 Q. And do you oversee the production code for all versions
01:37:41 8 of Echo products?

01:37:45 9 And you are familiar with the MPAF, M-P-A-F,
01:37:50 10 framework, right?

01:37:52 11 A. Yes.

01:37:52 12 Q. What does that stand for?

01:37:53 13 A. Multi Platform Audio Framework.

01:37:56 14 Q. You understand that the MPAF framework performs
01:38:03 15 beamforming, right?

01:38:04 16 A. One of the blocks of the algorithm is a fixed
01:38:12 17 beamforming.

01:38:12 18 Q. And the code performs that beamforming, correct?

01:38:15 19 A. Yes, that's my understanding.

01:38:18 20 Q. For all versions of the Echo products, correct?

01:38:21 21 A. For all version, yes.

01:38:25 22 Q. If I was to look in the code, how would I figure out
01:38:28 23 how many beams are formed by those products?

01:38:33 24 A. Well, there is -- I believe there is a parameter that
01:38:40 25 indicate the number of beams.

01:38:43 1 Q. Do you know where that parameter is?

01:38:46 2 A. I think it would be in what we call the configuration
01:38:50 3 file.

01:38:50 4 Q. Have you ever heard of an adaptive beamformer?

01:38:53 5 A. Adaptive beamformer, yes.

01:38:56 6 Q. And do you refer to the adaptive beamformer as
01:39:04 7 something else, with a different acronym?

01:39:05 8 A. ABF.

01:39:07 9 Q. So AIC is a combination of echo cancellation and ABF,
01:39:13 10 correct?

01:39:13 11 A. Yes.

01:39:14 12 Q. What is an echo canceler?

01:39:17 13 A. An echo canceler is an algorithm with the purpose of
01:39:28 14 canceling the signal produced by the -- a loudspeaker from
01:39:38 15 the signal captured by a microphone.

01:39:39 16 Q. So is there just one adaptive beamforming algorithm
01:39:45 17 that is used?

01:39:47 18 ATTORNEY: Objection to form.

01:39:48 19 A. Yes.

01:39:48 20 Q. And that's the adaptive beamforming algorithm that's
01:39:53 21 used on all the Echo products, right?

01:39:55 22 A. So let me be specific here. So the algorithm that is
01:39:58 23 used is a -- it's called ABF -- that's the name we
01:40:01 24 typically call it -- and is not using all the Echo product.

01:40:05 25 Q. Which Echo products use ABF?

01:40:07 1 A. So let me see. The first one that used ABF was Echo
01:40:22 2 Show, Knight. Then all -- so Sonar, Radar, Donut,
01:40:39 3 Crumppet -- oh, the -- the 2nd Generation Echo Show.

01:40:45 4 Q. Are there any MPAF products -- well, let me ask it in a
01:40:53 5 different way.

01:40:54 6 Are there any Echo products that utilize the MPAF
01:41:00 7 that do not utilize the adaptive beamforming?

01:41:05 8 A. So all the product I listed, they use MPAF. And one of
01:41:12 9 the block of MPAF is the ABF algorithm.

01:41:14 10 Q. So it's true that all of the MPAF algorithms have ABF
01:41:19 11 as a block, correct?

01:41:21 12 ATTORNEY: Objection to form.

01:41:23 13 A. Yes. All the one that I listed.

01:41:27 14 Q. I'd like to talk about fixed beamforming again, if
01:41:32 15 that's okay with you.

01:41:34 16 A. Okay.

01:41:34 17 Q. So with the fixed beamforming algorithm, you testified
01:41:41 18 earlier that there are coefficients that are utilized,
01:41:46 19 right?

01:41:46 20 A. Yes.

01:41:46 21 Q. And is it fair to say that those coefficients are in
01:41:56 22 your code somewhere?

01:42:01 23 A. There are coefficient in our code.

01:42:05 24 Q. How would I find those coefficients?

01:42:09 25 A. They would be in the coefficient file.

01:42:13 1 Q. So the coefficients would be in the configuration file;
01:42:13 2 is that fair?
01:42:19 3 A. I said the coefficient would be in the coefficient
01:42:22 4 file.
01:42:22 5 Q. Are there coefficients associated with the adaptive
01:42:27 6 beamformer?
01:42:27 7 A. There are coefficient associated with the ABF block.
01:42:32 8 Q. So there are coefficients associated with the ABF
01:42:38 9 block, correct?
01:42:38 10 A. Yes.
01:42:39 11 Q. What algorithm is used in the ABF block?
01:42:44 12 A. It is a noise canceling algorithm.
01:42:49 13 Q. And there is also an echo canceling algorithm, as well,
01:43:00 14 right?
01:43:00 15 A. In the MPAF.
01:43:02 16 Q. Is there a noise canceling in the Doppler product?
01:43:07 17 A. There is a form of noise canceling.
01:43:10 18 Q. And so, in other words, a fixed beamformer will form a
01:43:21 19 beam in all three of those directions, and the ABF block
01:43:29 20 will cancel out two of those portions from the third beam;
01:43:36 21 is that right?
01:43:36 22 A. Yes.
01:43:36 23 Q. Are you familiar with the term "adaptive filter"?
01:43:43 24 A. Yes.
01:43:44 25 Q. What is an adaptive filter?

01:43:46 1 A. It's a filter for which the coefficient change function
01:43:53 2 of a particular criterion.
01:43:57 3 Q. Can you give me an example?
01:43:59 4 A. An echo canceler would be such a filter.
01:44:04 5 Q. How is that adaptive?
01:44:05 6 A. So the coefficient change over time, and the criterion
01:44:11 7 used to decide the -- the coefficient is -- is a
01:44:17 8 minimization of quadratic error.
01:44:24 9 Q. How about code written in -- at the instruction set
01:44:30 10 level?
01:44:30 11 A. Some functions have been optimized at instruction set
01:44:34 12 level.
01:44:34 13 Q. How do you refer to it?
01:44:38 14 A. CMD instructions.
01:44:41 15 Q. Does your team write those CMD instructions for
01:44:45 16 specific processors?
01:44:46 17 A. Yes.
01:44:46 18 Q. Can you give me an example of a specific processor that
01:44:49 19 would have CMD instructions written for it?
01:44:52 20 A. The Intel Cherry Trail and ARM Core-A53.
01:45:04 21 Q. Do you know why it's done at the CMD level?
01:45:06 22 A. Yes.
01:45:06 23 Q. Why?
01:45:07 24 A. Because it's more efficient.
01:45:11 25 Q. Which portions of the algorithm are implemented at the

01:45:14 1 CMD level?

01:45:16 2 A. Part of the A -- ABF.

01:45:19 3 Q. Sir, have you heard of a -- have you ever heard of a

01:45:23 4 term called "voice activity detector"?

01:45:25 5 A. Yes.

01:45:25 6 Q. What is that?

01:45:26 7 A. It's an algorithm block that has purpose to detect if

01:45:34 8 the audio signal contained voice or not.

01:45:37 9 Q. Do you know if -- if the Doppler product utilizes a

01:45:44 10 voice activity detector?

01:45:46 11 A. Let me see. It does.

01:45:57 12 Q. How about the MPAF products, do they use a voice

01:46:02 13 activity detector?

01:46:04 14 A. Yes.

01:46:05 15 Q. So then what are you using to represent the signal if

01:46:09 16 not time?

01:46:13 17 A. So frequency.

01:46:16 18 Q. Anything else?

01:46:17 19 A. And then we have a frequency representation every

01:46:22 20 frame.

01:46:23 21 Q. You said that there's a frequency representation of

01:46:26 22 every frame? Is that what you said?

01:46:28 23 A. Yes.

01:46:28 24 Q. And do you count the frames as you go?

01:46:35 25 A. Part of the system count the frame.

01:46:39 1 Q. So you index the frame; is that fair?

01:46:44 2 A. Yes.

01:46:45 3 Q. Is there also something called a window?

01:46:50 4 A. Yes.

01:46:50 5 Q. What is the window?

01:46:54 6 A. It's time and weight of the temporal samples.

01:47:00 7 Q. Can you give me an example of a time weight?

01:47:03 8 A. Most common windows, they're called Hanning windows or

01:47:13 9 Hamming window or Blackman.

01:47:13 10 Q. Isn't there a time window over which you determine

01:47:16 11 whether to switch beams?

01:47:18 12 A. Yes.

01:47:18 13 Q. What is that time window?

01:47:21 14 A. It varies product-to-product.

01:47:24 15 Q. Do you know what the shortest time window is?

01:47:33 16 A. I believe it's a hundred millisecond.

01:47:35 17 Q. So for the product with the shortest time window, do

01:47:39 18 you know what product that is?

01:47:40 19 A. I believe 100 millisecond is used on Knight.

01:47:44 20 Q. So in the Knight product, for example, every 100

01:47:53 21 milliseconds, there's a determination as to whether to

01:47:55 22 switch beams, right?

01:47:57 23 A. Yes.

01:47:59 24 Q. So if your sound acquisition took place over 2 seconds,

01:48:04 25 there would be 20 determinations as to whether to switch

01:48:07 1 beams, right?

01:48:10 2 A. Yes.

01:48:10 3 Q. And that determination as to whether to switch beams
01:48:20 4 comes from the output of the ABF, which is then input into
01:48:32 5 the beam selector, right?

01:48:33 6 A. The determination comes from the beam selector.

01:48:41 7 Q. Right. And the beam selector receives the signal from
01:48:44 8 the ABF, right?

01:48:47 9 A. Yes.

01:48:48 10 Q. So the beam selector is determining once every 100
01:48:52 11 milliseconds which of the ABF output signals to select,
01:48:57 12 right?

01:48:57 13 A. Yes.

01:48:57 14 Q. So then, in your experiment, if a person moved from the
01:49:03 15 left side of the device to the right side of the device and
01:49:08 16 was speaking for a period longer than 100 milliseconds, you
01:49:13 17 would expect with 80 percent accuracy that the beam would
01:49:16 18 change from the beam on the left side of the device to the
01:49:19 19 beam on the right side of the device. Correct?

01:49:21 20 A. I say yes.

01:49:24 21 Q. So when you say -- when you're saying CMD, it wasn't
01:49:29 22 CMD, it was SIMD, S-I-M-D, right?

01:49:35 23 A. Yes. Yes.

01:49:36 24 Q. And that's the advanced SIMD extension also known as
01:49:41 25 Neon for the ARM processor, right?

01:49:43 1 A. Yes.

01:49:44 2 (Videoclip ends.)

01:49:45 3 THE COURT: Does that complete this witness by
01:49:47 4 deposition?

01:49:47 5 MR. FABRICANT: Yes, Your Honor.

01:49:50 6 THE COURT: Call your next witness, Plaintiff.

01:49:51 7 MR. FABRICANT: Your Honor, the next witness is
01:49:54 8 also a witness by video deposition. Ms. Park will announce
01:49:58 9 the witness.

01:50:04 10 MS. PARK: Plaintiff calls by deposition Amit
01:50:07 11 Chhetri, principal research scientist at Amazon's Lab126.

01:50:12 12 Playing time for Plaintiff is 24 minutes, 23
01:50:14 13 seconds; and Defendants' is 38.

01:50:16 14 THE COURT: Proceed with this witness by
01:50:18 15 deposition.

01:50:18 16 AMIT CHHETRI, PLAINTIFF'S WITNESS

01:50:18 17 PRESENTED BY VIDEO DEPOSITION

01:50:18 18 (Videoclip played.)

01:50:32 19 Q. Good morning, sir. Can you please state your name for
01:50:36 20 the record?

01:50:36 21 A. Amit Chhetri.

01:50:39 22 Q. Sir, for whom do you currently work?

01:50:45 23 A. I work for Amazon Lab126.

01:50:47 24 Q. How long you have worked there?

01:50:54 25 A. I have worked at Amazon Lab126 for a little over nine

01:51:03 1 years.

01:51:03 2 Q. What's your understanding of what the company Amazon
01:51:15 3 Lab126 does? What business is it in?

01:51:19 4 A. Amazon Lab126 is a hardware research and development
01:51:27 5 center. We build products like Echo products which are
01:51:36 6 sold under the brand of Amazon.

01:51:38 7 Q. When you say you worked on the original Echo product,
01:51:43 8 did you call it the Echo, or did it have an internal code
01:51:46 9 name?

01:51:46 10 A. It did have an internal code name. There were at least
01:51:50 11 two code names, and the -- the name Echo was announced.

01:51:55 12 Q. What were those code names?

01:51:56 13 A. The first code name was Project D, D for Denver, and
01:52:09 14 subsequently, it was called Doppler.

01:52:12 15 Q. So when the project was released as the Echo, did you
01:52:17 16 maintain that internal code name for the released product,
01:52:20 17 as well?

01:52:20 18 A. Yes.

01:52:24 19 Q. Did any of the software you wrote end up on the
01:52:28 20 finished Echo product?

01:52:30 21 A. Yes, some of the software -- they ended up on the
01:52:35 22 finished Echo product.

01:52:36 23 Q. Are you familiar with the term "audio front end," or
01:52:42 24 AFE?

01:52:43 25 A. Yes, I am.

01:52:44 1 Q. What does that mean to you?

01:52:49 2 A. Audio front end, to me, it means if there are back end
01:53:01 3 customer-centric applications or different that our
01:53:06 4 specific algorithms that work on captured audio data on the
01:53:12 5 microphones or they apply some processing on play-back
01:53:23 6 signal so that the play-back signal is pleasing to
01:53:23 7 customer's ears while at the same time the signals captured
01:53:27 8 by the microphone, if they want to be used for some further
01:53:32 9 processing, then they are appropriately enhanced by the
01:53:39 10 software suite.

01:53:39 11 Q. And -- and that's the software suite you worked on,
01:53:43 12 right, the audio front end?

01:53:48 13 A. I -- I worked on -- yeah, I worked on parts of audio
01:53:53 14 front end.

01:53:53 15 Q. When did you start working on Project D?

01:53:56 16 A. The Project D, as I understand it, around June --
01:54:08 17 around summer, I would say June 2011, June/July, something
01:54:12 18 around -- somewhere around that time, if I can remember
01:54:14 19 correctly.

01:54:15 20 Q. What were you working on before June/July 2011?

01:54:19 21 A. I was working on another project which did not get
01:54:23 22 released.

01:54:24 23 Q. What was that project, sir?

01:54:28 24 A. That was Project C.

01:54:32 25 Q. When did you start working on Project C?

01:54:38 1 A. Around the time of my joining, February 2011.

01:54:42 2 Q. How did you learn about Project C?

01:54:46 3 A. I think, yeah, through my manager. It was probably
01:54:49 4 some general informational -- information exchange, you
01:54:53 5 know, like what all projects are going on here.

01:54:59 6 Q. Do you think that some time in April/May of 2011, your
01:55:04 7 manager may have told you about what other general projects
01:55:07 8 were going on at Amazon, including Project B; is that fair?

01:55:11 9 A. My understanding, I knew only about Project C and
01:55:17 10 Project B, and -- yes, around April or May, to my memory.

01:55:22 11 Q. So before you had moved on from Project C to Project D,
01:55:35 12 had you spoken with anyone at Amazon about Project D?

01:55:41 13 A. Project D?

01:55:41 14 Q. Yes.

01:55:43 15 A. Before -- let me try and understand this question.

01:55:45 16 Before I moved on from Project C to Project D, did I speak
01:55:51 17 to anybody about Project D? Well, I was -- yeah, I mean,
01:55:59 18 I -- I certainly was told about Project D as I started
01:56:03 19 working on it, again, through my managers, for example.

01:56:06 20 Q. Who were your managers at the time?

01:56:15 21 A. There was a person by the name Ed Crump, but he's
01:56:29 22 not -- he's not at Amazon right now.

01:56:31 23 Q. Did he also move from Project C to Project D with you?

01:56:37 24 A. No. Both projects were -- were running on -- on --
01:56:46 25 under him. I should also clarify that I did not altogether

01:56:51 1 move to Project D. I was working on -- on both until I
01:56:54 2 eventually later moved on to Project D.

01:57:00 3 Q. So at some point in time around June/July 2011, you
01:57:04 4 started working on both Project C and Project D; is that
01:57:10 5 fair?

01:57:13 6 A. Yes.

01:57:15 7 Q. And when did you completely move on from Project C to
01:57:21 8 Project D?

01:57:21 9 A. I can't remember the exact date, but maybe early 2013
01:57:29 10 or something.

01:57:29 11 Q. You had a cubicle office on the second floor in
01:57:33 12 Amazon's facility in April of 2011 while you were working
01:57:38 13 on Project C, right?

01:57:41 14 A. Yes.

01:57:51 15 Q. And when you began working on Project D in June or July
01:57:55 16 of 2011, did you continue to work from that same cubicle?

01:58:02 17 A. I believe so.

01:58:03 18 Q. So on the second floor at Amazon with your keycard
01:58:10 19 access, you could -- you could get to some of your
01:58:16 20 colleagues working on Project C. You could also get to
01:58:19 21 some of your colleagues working on Project D, as well,
01:58:23 22 right?

01:58:23 23 A. Yes.

01:58:24 24 Q. And in that time period where you started working on
01:58:31 25 Project D in June/July of 2011, do you know if you had any

01:58:35 1 other colleagues who were working on both Project C and D?

01:58:39 2 A. Yes.

01:58:39 3 Q. Now, to your knowledge, did Mr. Wei Li --

01:58:43 4 A. Oh.

01:58:44 5 Q. -- work on Project D from the end of 2011 to the
01:58:48 6 beginning of 2012?

01:58:49 7 A. I think he was participating in Project D. I don't
01:59:03 8 know if he was working on other projects also. He was
01:59:06 9 possibly still on Project D.

01:59:06 10 Q. And at least in the professional capacity, you had
01:59:11 11 discussions with him about your work, right?

01:59:13 12 A. I discussed with him in the capacity of the work that
01:59:22 13 he and I were supposed to collaborate on or work together
01:59:25 14 on -- on Project D.

01:59:28 15 Q. Do you know how many people at Amazon were working on
01:59:32 16 audio algorithms in 2011?

01:59:34 17 A. I don't have an exact number. But around 10, I would
01:59:43 18 say.

01:59:43 19 Q. Did that number change in 2012?

01:59:49 20 A. I can't say. But I would say marginally.

01:59:53 21 Q. So were there any audio algorithm efforts for Project C
01:59:58 22 that you're aware of?

01:59:59 23 A. Yes.

01:59:59 24 Q. How many people were working on audio algorithm efforts
02:00:06 25 for Project C?

02:00:07 1 A. So I -- as I understand, there was only one audio
02:00:12 2 algorithms team. And, you know, there were 10 to 12 people
02:00:19 3 in that team. And that was sort of distributed among the
02:00:20 4 two projects. That's how it was set up.

02:00:26 5 Q. So it was the same audio algorithms team working on
02:00:29 6 both Project C and D at Amazon in the 2011 to '12 time
02:00:35 7 frame, right?

02:00:35 8 A. To my understanding, yes.

02:00:37 9 Q. So the algorithms that ultimately went into the Echo
02:00:42 10 products were not solidified in 2011, correct?

02:00:47 11 A. Yeah. We -- we -- we had an idea, we had a general
02:00:54 12 direction, but, you know, we will -- we had plans, but we
02:01:00 13 were working with an open -- open-mind intellect. We need
02:01:05 14 prototypes, we need actual device form factors.

02:01:10 15 Q. So before 2012 when you were working on audio
02:01:15 16 algorithms, you didn't know whether the user of the Echo
02:01:19 17 device would have to be close to the device or farther
02:01:24 18 away, correct?

02:01:25 19 A. Well, we -- we had -- we had a range in mind, but we
02:01:30 20 didn't think that it's going to be 20 feet away. So we had
02:01:34 21 a range in mind that it's -- let's say it's used in some --
02:01:39 22 someplace, living room or kitchen, and a person will not
02:01:44 23 necessarily walk to the device and talk to it, speak from 6
02:01:49 24 feet away, 7 feet away, but maybe not 30 feet away, so --
02:01:54 25 or 25 feet away. So we had a range in mind.

02:01:57 1 Q. Where did that range come from, did you come up with
02:02:05 2 it?

02:02:05 3 A. I didn't personally come up with it, but it was
02:02:08 4 discussions through product managers, managers, ID people,
02:02:14 5 initial discussions.

02:02:17 6 And you sort of always asked what is the key
02:02:20 7 feature we are building? What is the user experience?

02:02:25 8 So, yeah, at that time, that's what we were told.

02:02:29 9 Q. And then in 2012, the distance solidified, and you knew
02:02:34 10 you needed a far-field algorithm, correct?

02:02:37 11 A. It solidified, and we knew that we have to cater to
02:02:48 12 users to -- to user experience that people can speak to
02:02:54 13 this device from more than 20 feet away. That's the sort
02:02:58 14 of -- that -- it crystallized in that way.

02:03:00 15 Q. So with regard to Project D, it's your testimony that
02:03:07 16 some work on Project C ultimately bled over into Project D,
02:03:11 17 and there were collaborations between the two projects that
02:03:14 18 ultimately resulted in Project D, correct?

02:03:17 19 A. As I mentioned earlier, it was the same audio team that
02:03:21 20 was -- some -- some were working on C, some were working on
02:03:24 21 D, some were working on both.

02:03:27 22 The feature set is -- was slightly different. But
02:03:32 23 some of the early learning on Project C, we -- we were able
02:03:38 24 to transfer that to Project D and vice versa.

02:03:47 25 Q. So it's true that you were able to transfer some of the

02:03:50 1 early learning on Project C to Project D, correct?

02:03:56 2 A. Yes.

02:03:57 3 Q. And with regard to Project D and microphone arrays,

02:04:03 4 you -- your plans to use a microphone array for Project D

02:04:15 5 solidified in late 2011, early 2012, correct?

02:04:21 6 A. It became more apparent that we will need Project -- we

02:04:24 7 will need a microphone array on Project D in late 2011,

02:04:30 8 early 2012.

02:04:30 9 Q. Have you heard of the term "audio front end"?

02:04:33 10 A. Yes.

02:04:33 11 Q. And have you heard of the term "MPAF," M-P-A-F?

02:04:43 12 A. Yes.

02:04:43 13 Q. What does MPAF stand for?

02:04:47 14 A. MPAF is -- I think it's Multi Platform Audio Framework.

02:04:55 15 Q. Is it your understanding that the MPAF framework --

02:05:06 16 well, let me ask you a different question.

02:05:08 17 Which Echo products do you understand the MPAF was

02:05:12 18 used with?

02:05:13 19 A. Almost all -- all products that we were releasing are

02:05:17 20 using MPAF, bearing some initial ones.

02:05:20 21 Q. So with regard to -- with regard to the beamformers you

02:05:28 22 were talking about, are you familiar with the term

02:05:34 23 "filter-and-sum"?

02:05:35 24 A. Filter-and-sum, yes, I understand that, yeah.

02:05:37 25 Q. How do you implement -- how do you implement

02:05:40 1 filter-and-sum in MATLAB?

02:05:41 2 A. How do we implement filter-and-sum in MATLAB?

02:05:45 3 You first need to design the filter. And then
02:05:55 4 once you have designed the filter, you can implement -- you
02:05:59 5 can -- you can apply the filter on the data, and then --
02:06:05 6 then just apply it -- I presume here we're talking about
02:06:09 7 microphones.

02:06:10 8 So if we have N microphones, you can -- you first
02:06:14 9 need to design the filter for N microphones. And then we
02:06:19 10 apply the filter on the data of each of the N microphones
02:06:23 11 according to their own filters. And then generally we just
02:06:26 12 add the filtered output. Either we add it directly or we
02:06:30 13 average it in some way, but -- but, yeah.

02:06:32 14 Q. Okay. And so you said that there are filter
02:06:37 15 coefficients that are applied to each of the microphones;
02:06:40 16 is that right?

02:06:40 17 A. Yeah. For the filter coefficients are specific to the
02:06:47 18 look-direction and to the microphone.

02:06:49 19 But once the filter coefficients are designed for
02:06:53 20 a given look-direction, for a given microphone, then
02:06:57 21 they're applied on that microphone.

02:06:58 22 Q. So for a given look-direction and a given microphone,
02:07:04 23 how do you design the filter coefficients?

02:07:06 24 A. Well, I think -- yeah. I think I -- I explained it
02:07:13 25 earlier, that we do a convex optimization. We -- we

02:07:19 1 formulate the problem as a convex optimization problem.

02:07:25 2 And the -- you know, the -- once it is a convex
02:07:30 3 optimization problem, we run it through a convex
02:07:33 4 optimization solver. And it will generate the filter
02:07:40 5 coefficient on a frequency-by-frequency basis. It will
02:07:45 6 generate a set of coefficients, the solver is -- provide a
02:07:47 7 set of coefficients for each microphone.

02:07:47 8 Q. And then when you get up to 8,000 -- or sorry, 8
02:07:52 9 kilohertz, that means 8,000 samples per second, right?

02:07:56 10 A. Oh, well, let's -- let's -- let's think about that.
02:07:59 11 No. So the data is sampled at 16 kilohertz. So the time
02:08:04 12 settings that we are getting from the microphone, it's
02:08:07 13 sampled at 16 kilohertz, you know, 16,000 samples per
02:08:12 14 second.

02:08:12 15 But then you do an FFT transformation of that.
02:08:17 16 You have to take a frame of data, and you take an FFT
02:08:22 17 transformation of that. And that gives you the -- the
02:08:24 18 complex domain samples in each frequency. And that's what
02:08:27 19 we sort of work with.

02:08:29 20 Q. And so when you do this FFT transform -- sorry. I said
02:08:36 21 FFT.

02:08:37 22 Is it -- is it a Fast Fourier, is it a regular
02:08:43 23 Fourier? What kind of transform is it?

02:08:45 24 A. Right. So there are variations. We do windowing in
02:08:52 25 FFT. So it's -- it's a Fast Fourier. So you have a frame

02:08:57 1 of data, and you apply an overlapping window between one
02:09:01 2 frame and the next frame. And the amount of the overlap
02:09:04 3 can be 50 to 75 percent.

02:09:06 4 But, basically, you take a frame of data and you
02:09:08 5 apply windowing on it. And then you take in 50 of that, of
02:09:14 6 that variant 1. MPAF has a different -- MPAF has a
02:09:18 7 different variation.

02:09:19 8 Q. So what is the frame of data -- how -- how much time
02:09:23 9 does that cover in the time domain?

02:09:25 10 A. When we look at -- well, our audio processing frames --
02:09:30 11 let -- let me think. Let me -- let me make sure that I
02:09:34 12 have it correct.

02:09:34 13 So it's 16 milliseconds frame with 8 milliseconds
02:09:44 14 of hop. That means there will be 50 percent overlap
02:09:47 15 between 2 inches in frames. Yeah, that's -- that's --
02:09:54 16 that's what we're doing in MPAF. It's kind of similar --
02:09:58 17 similar around that.

02:09:58 18 Q. You generated the coefficients for -- for Echo, Echo
02:10:03 19 Show, Sonar, Radar, and FireTV Cube, right?

02:10:11 20 A. That's -- that's correct. That's correct. In the
02:10:18 21 forms that I -- I would use it.

02:10:20 22 Q. The MATLAB code, that's not a finished product code,
02:10:26 23 right?

02:10:26 24 A. Let me think about this. The -- the -- yeah, yeah,
02:10:39 25 the -- the coefficients are not generated in -- in the

02:10:44 1 production code. They lie there. But -- but they are
02:10:51 2 generated -- the first cut is through -- through MATLAB.
02:10:55 3 The first step. There can be a few more steps but the
02:10:59 4 first step is through MATLAB.

02:11:00 5 Q. So we talked about you making the coefficients.

02:11:03 6 But have you ever had to change the coefficients
02:11:10 7 for a product? I mean, beamformer coefficients?

02:11:19 8 A. Change the coefficients for the same product?

02:11:21 9 Q. Yes.

02:11:21 10 A. Probably has -- has happened. I mean, maybe for --
02:11:29 11 maybe for one or two products. I mean, like Sonar -- I
02:11:35 12 mean, maybe Sonar, Radar, we were kind of playing around --
02:11:40 13 we were kind of experimenting with -- with this acoustic
02:11:46 14 modeling effort.

02:11:47 15 And, initially, we had -- initially, we had the
02:11:51 16 coefficients as non-acoustic modeling, non -- non-FEM-based
02:12:00 17 beamformer. And then once the FEM-based coefficients
02:12:05 18 were -- were available and they are -- they are better,
02:12:08 19 then -- then, obviously, we -- we pushed those
02:12:11 20 coefficients.

02:12:11 21 Q. When you say you pushed the coefficients, you mean you
02:12:18 22 released the software update that changed the coefficients
02:12:21 23 on the customers 'products?

02:12:23 24 A. In some -- in some special cases, yes. Software
02:12:28 25 announcements can be done as -- we call it OTA,

02:12:36 1 over-the-air.

02:12:37 2 Q. What part of the light bar lights up?

02:12:41 3 A. It corresponds to the -- the best beam that the device
02:12:45 4 thinks at that point of time.

02:12:46 5 Q. And if you can, just let me know if -- if this looks
02:12:53 6 like the Alexa Help and Support page from Amazon's website.

02:12:59 7 A. Yeah, yeah, it says: All Things Alexa, Alexa Help and
02:13:10 8 Support.

02:13:10 9 Q. I'd like you to flip to the second page of this
02:13:14 10 document. Do you see where it says: Light indicators? Do
02:13:17 11 you see the blue indicator on the top left of the pictures?

02:13:20 12 A. Yes, I do see that.

02:13:22 13 Q. Can you read me what it says under Blue indicator?

02:13:29 14 A. This is a color you more -- you'll see most often when
02:13:34 15 interacting with Alexa. When Alexa detects the wake word,
02:13:38 16 the indicator will turn solid blue with light pointing in
02:13:43 17 the direction of the person speaking. These colors will
02:13:46 18 begin alternating as Alexa responds. Blue indicators can
02:13:50 19 also mean that your device is trying to pair or connect
02:13:53 20 with other devices.

02:13:55 21 Q. So you see that, at least on Amazon's website, Amazon
02:14:00 22 is saying that the light blue points in the direction of
02:14:07 23 the person speaking? You see that on this page, right,
02:14:10 24 sir?

02:14:10 25 A. Light blue? Is -- okay. So this is -- this is Amazon

02:14:18 1 web page? This from Amazon website?

02:14:25 2 Okay. I mean, I -- I read it, yes.

02:14:29 3 Q. Do you disagree with those statements, sir?

02:14:31 4 A. I think I would say I understand what the algorithm
02:14:37 5 is -- is intending to do. Yeah, and -- and it has been
02:14:46 6 written like this. So there have been some transformation
02:14:58 7 of my technical interpretation and how it is written.

02:15:02 8 Q. So is this the type of document that you were talking
02:15:05 9 about that would generate coefficients?

02:15:12 10 A. Yeah. I -- I think -- I think this -- yeah, this one
02:15:22 11 is generating in subband domain. Let me see. Let me have
02:15:30 12 a look at it.

02:15:31 13 Well, this is -- I -- I don't think this is taking
02:15:35 14 the -- the model-based approach. This is still free feel
02:15:43 15 sort of thing. But, yeah, this is -- let's see. Yeah.
02:15:50 16 Yeah, this is -- this is -- this is used in some form, some
02:15:53 17 product, yeah.

02:15:54 18 (Videoclip ends.)

02:15:55 19 THE COURT: Does that complete this witness by
02:16:02 20 deposition?

02:16:02 21 MR. FABRICANT: Yes, Your Honor. We are calling
02:16:04 22 another witness by deposition, and Ms. Park will announce
02:16:06 23 the witness, Your Honor.

02:16:08 24 THE COURT: You may proceed with your next witness
02:16:10 25 by deposition.

02:16:11 1 MS. PARK: Plaintiff calls by deposition Philip
02:16:19 2 Hilmes, director of audio technology at Amazon's Lab126.
02:16:22 3 Play time for Plaintiff is 17 minutes, 41 seconds.

02:16:25 4 THE COURT: No time for Defendant?

02:16:27 5 MS. PARK: No time.

02:16:28 6 THE COURT: Proceed with this witness by
02:16:29 7 deposition.

02:16:29 8 PHILIP HILMES, PLAINTIFF'S WITNESS

02:16:29 9 PRESENTED BY VIDEO DEPOSITION

02:16:29 10 (Videoclip played.)

02:16:31 11 Q. Can you please state your full name for the record?

02:16:33 12 A. Yes. My full name is Philip Ryan Hilmes. That's Ryan.

02:16:39 13 Q. Mr. Hilmes, for whom do you currently work?

02:16:42 14 A. I work for Amazon Lab126. A2Z Development Corporation.

02:16:50 15 Q. How long you have worked there?

02:16:51 16 A. Since December 2012, so a little over seven years now.

02:16:57 17 Q. But there were numerous people working on the Fire
02:17:04 18 Phone at some point in time at Amazon, right?

02:17:06 19 A. Yes.

02:17:07 20 Q. And after the Fire Phone stopped going forward as a
02:17:13 21 product, did any of those people working on the Fire Phone
02:17:17 22 start working on the Echo products?

02:17:20 23 A. Yes. Some of them did transition over to roles where
02:17:27 24 they were working on Echo products.

02:17:28 25 Q. So, to your knowledge, there was some overlap there

02:17:33 1 with people bringing over their expertise from the Fire

02:17:38 2 Phone product over to the Echo products, right?

02:17:40 3 A. Sorry, which Echo products are you talking about?

02:17:43 4 Q. Any Echo products.

02:17:45 5 A. Some of the people who were working on the Fire Phone

02:17:54 6 previously, joined the teams that were working on Echo

02:18:00 7 products, and they had their, you know, breadth of -- of

02:18:06 8 expertise that they brought with them to work on those Echo

02:18:11 9 products.

02:18:11 10 Q. You said that your team also provides support for these

02:18:14 11 products by way of updates, correct?

02:18:20 12 A. Yes, we provide software updates to those products.

02:18:24 13 Q. It's your testimony that there are two ways -- two

02:18:28 14 mechanisms to update software on Echo products, correct?

02:18:33 15 A. For customers, yes. There are other ways internally.

02:18:38 16 But for customers, it's either through getting a new unit

02:18:44 17 from a factory with updated software or through downloading

02:18:50 18 via OTA update.

02:18:54 19 Q. But the updates were always released by Amazon,

02:18:57 20 correct?

02:18:57 21 A. Yes. There were updates, yeah, released by Amazon, not

02:19:02 22 by anybody else.

02:19:02 23 Q. So let me ask you about the audio front end provided by

02:19:10 24 your department at Amazon.

02:19:13 25 A. Okay.

02:19:13 1 Q. Do all versions of that audio front end utilize
02:19:17 2 beamforming?

02:19:19 3 A. Yes, I believe they utilize beamforming.

02:19:26 4 Q. All the -- all the Echo products that have your audio
02:19:31 5 front end utilize some form of fixed beamforming, correct?

02:19:36 6 A. Yes, I believe that is the case.

02:19:42 7 Q. Do you know what fixed beamforming algorithm is used by
02:19:46 8 the audio front end of the Echo products that you -- your
02:19:51 9 team works on?

02:19:52 10 A. I would describe the fixed beamforming algorithm as a
02:19:56 11 filter-and-sum.

02:20:01 12 Q. Were the number of beams that are formed, changeable?
02:20:05 13 Is it based on the situation?

02:20:07 14 A. The number of beams for any particular product, yes,
02:20:12 15 can be changed with a software update. That is possible.

02:20:17 16 Q. But you at least know that the directivity patterns for
02:20:21 17 each beam were oriented in different angles so as to have
02:20:31 18 directivity patterns separated by 60 degrees symmetrically
02:20:39 19 around the device, right?

02:20:39 20 A. Yes, that is correct.

02:20:47 21 Q. So from a user's perspective, it can tell -- the user
02:20:51 22 can tell by looking at the light and specifically by which
02:20:55 23 lights have a lighter color, which direction the Alexa is
02:21:04 24 listening in, correct?

02:21:05 25 A. Technically, it can -- the customer can tell which beam

02:21:09 1 was selected approximately, yes.

02:21:13 2 Q. So if there are more beams than there are physical
02:21:16 3 microphones and -- would each of the beams still have the
02:21:41 4 same pattern or at least a similar pattern?

02:21:41 5 A. In a four-microphone array, if you have more than four
02:21:41 6 beams that are not -- you know, that are, in fact,
02:21:45 7 different beams, I would not expect them to have the same
02:21:50 8 pattern. It will -- it will change.

02:21:52 9 Q. And, again, the process by which it forms each of these
02:21:55 10 beams, it's called filter-and-sum in all of the devices; is
02:21:59 11 that right?

02:21:59 12 A. Yes, all the devices use filter-and-sum beamforming.

02:22:02 13 Q. Do you know what filter is applied during the
02:22:07 14 filter-and-sum process?

02:22:07 15 A. Do I know personally? No.

02:22:13 16 It's a filter that's computed offline.

02:22:18 17 Q. So it's a filter that's computed offline, and then that
02:22:23 18 filter is applied by the source code, right?

02:22:25 19 A. That is correct.

02:22:27 20 Q. But the filters depend on the geometry of the
02:22:31 21 microphones, right?

02:22:32 22 A. I was -- yeah, I mean, I was speaking about the
02:22:46 23 geometry of the device. So -- but, yeah, the -- the -- the
02:22:55 24 beamformer takes into account the microphone array that's
02:23:01 25 specific to that device.

02:23:02 1 Q. And, accordingly, the filter will be affected in some
02:23:09 2 way by the geometry of the microphone array, right?

02:23:14 3 A. Yes, the -- the directivity pattern and other things
02:23:25 4 can change with the geometry of the array.

02:23:27 5 Q. And the geometry of the array includes things like
02:23:34 6 spatial position of the microphones related to each other,
02:23:38 7 angles of separation, distance between the microphones,
02:23:43 8 right? Those are characteristics of the microphone
02:23:46 9 geometry, aren't they?

02:23:47 10 A. Yeah, those are -- those things can have an impact.

02:23:52 11 Q. And when you mean the subband domain, that's based on a
02:23:59 12 sampling frequency, right?

02:24:00 13 A. I wouldn't state it like that. It's based on different
02:24:08 14 bands which correspond to different frequency ranges.
02:24:18 15 The -- the in -- input sample rate, though, to that process
02:24:24 16 stays the same.

02:24:25 17 Q. And what is the input sample rate, sir?

02:24:30 18 A. For our products, it -- it depends. Some use 16
02:24:37 19 kilohertz, others use 48 kilohertz. I think those are the
02:24:49 20 two main ones that are used.

02:24:50 21 Q. And 16 kilohertz means you are taking a sample
02:24:54 22 1/16,000th of a second -- every 1/16,000th of a second,
02:25:00 23 right?

02:25:00 24 A. Every 1/16th -- yes, that's effectively correct. Yes.

02:25:06 25 Q. And as you said earlier, those processors would be

02:25:08 1 running the C, C++, and optimized assembly code; is that
02:25:14 2 correct?

02:25:14 3 A. Yes, that's correct.

02:25:24 4 Q. And -- ...released a product. The processor you chose
02:25:32 5 for that specific product had sufficient computing power to
02:25:35 6 do what you needed it to do for that product, right?

02:25:39 7 A. I would say yes. Otherwise, we wouldn't have released
02:25:48 8 the product, yes.

02:25:49 9 Q. I would like to introduce as Exhibit 4 a document
02:25:52 10 bearing production label AMZN00005573 through 5577.

02:26:04 11 And in the first paragraph from the abstract it
02:26:06 12 says: Far-field automatic speech recognition, ASR, is a
02:26:10 13 key enabling technology that allows untethered natural
02:26:14 14 voice interaction between users and Amazon Echo family of
02:26:17 15 products.

02:26:18 16 Right?

02:26:18 17 A. That's what I read, yes.

02:26:20 18 Q. And then later you say: In this paper, we discuss the
02:26:27 19 key algorithms within the AFE, and we provide insights into
02:26:31 20 how these algorithms help in mitigating the various
02:26:35 21 acoustical challenges for far-field processing.

02:26:41 22 Do you see that?

02:26:41 23 A. Yes, I do see that.

02:26:42 24 Q. So if Amazon says its products work in a certain way to
02:26:48 25 the public, the public is expected to trust Amazon, that

02:26:52 1 Amazon is selling the truth?

02:26:53 2 A. Yes. Generally, to my knowledge, if Amazon makes a
02:26:59 3 public statement about its products, it's generally
02:27:01 4 reviewed by the PR team, and the PR team will often ask the
02:27:14 5 engineers and other knowledgeable people, is this accurate?
02:27:19 6 And so there is generally about vetting of that.

02:27:25 7 Q. So your expectation would be that if Amazon tells the
02:27:31 8 public its products work in a certain way, that the public
02:27:35 9 should expect those statements to be true, right, sir?

02:27:40 10 A. Yeah, for example, if a -- if something is on a product
02:27:44 11 detail page on its website about its products, I would
02:27:47 12 generally expect most of that to be true. Mistakes can
02:27:53 13 always be made, but I do know that the company goes through
02:27:58 14 significant efforts to try and get those details correct.

02:28:02 15 Q. Now, you said that in this process for adaptive
02:28:06 16 beamforming, there is some cancellation of a portion of the
02:28:08 17 beam; is that right?

02:28:09 18 A. What we do is take one beam and use it as a reference
02:28:19 19 in the -- in an adaptive filter to cancel that signal
02:28:25 20 and -- from the signal that represents another beam.

02:28:29 21 Q. So at the end of the day, the shape of the beam -- of
02:28:34 22 the ultimate beam has changed from the original beam,
02:28:38 23 right?

02:28:38 24 A. I -- I would -- it may have, yes. I would need to
02:28:49 25 verify that with a particular beam and whatever was the

02:28:52 1 reference beam. So I can't say for sure. But, yes, it may
02:28:57 2 have.

02:28:58 3 Q. Did you ever have anybody to come into Amazon to give a
02:29:02 4 talk about some technology that you might want to use for
02:29:05 5 the audio front end?

02:29:09 6 A. Yes.

02:29:12 7 Q. How many have you had come in to do that?

02:29:17 8 A. I -- I don't know. I would guess probably more than 10
02:29:26 9 but less than 30, something in that range.

02:29:31 10 Q. So you've had more than 10 but less than 30 parties
02:29:38 11 come in to talk to you about ways that could potentially
02:29:41 12 help you with your audio front end, right?

02:29:43 13 A. That's my best estimate, yeah.

02:29:46 14 Q. Have you ever used any smaller companies?

02:29:49 15 A. For -- for audio front end, not that I recall, no.

02:29:59 16 Q. Do you recall having any meetings with smaller
02:30:03 17 companies?

02:30:04 18 A. Some of them.

02:30:05 19 Q. Is it common for Amazon to publish papers about certain
02:30:09 20 algorithms or technology that it's investigating but hasn't
02:30:14 21 implemented in any product?

02:30:16 22 A. No.

02:30:19 23 Q. So in the context of this document, you have a fixed
02:30:26 24 beamformer, an adaptive beamformer, and a beam selector,
02:30:29 25 and the beam selector is selecting the output of the

02:30:35 1 adaptive beamformer -- the six outputs of the adaptive
02:30:38 2 beamformer, correct?

02:30:40 3 A. Yes, that's correct.

02:30:45 4 Q. And you testified that the adaptive beamformer takes
02:30:49 5 the fixed beams, which are beams, and then applies -- or
02:30:56 6 subtracts another beam from them, right?

02:31:00 7 A. Yeah, the adaptive beamformer adaptively filters --
02:31:07 8 adaptively cancels a reference beam from the -- from each
02:31:14 9 of the -- the inputs coming from the fixed beamformer.

02:31:22 10 Q. So in terms of what's in the adaptive beamformer, beams
02:31:26 11 come in, beams are subtracted, right?

02:31:30 12 A. Yes, that's -- that's generally correct.

02:31:35 13 Q. And after the output of adaptive beamforming, beam
02:31:41 14 selection is performed, correct?

02:31:47 15 A. The beam selector module is called.

02:31:52 16 Q. Now, you've said several times now that the adaptive
02:31:59 17 beamforming is done adaptively. You mean that the process
02:32:03 18 is performed multiple times, right?

02:32:08 19 A. What I mean by adapt -- the adaptive -- sorry, the
02:32:14 20 out -- adaptive beamforming in our case means that an
02:32:26 21 adaptive filter is used, meaning that the filter is being
02:32:30 22 updated.

02:32:31 23 Q. And so also to confirm, in terms of what is sent at the
02:32:37 24 output of the beam selector, the output of the beam
02:32:43 25 selector is also changing over time. You confirmed that,

02:32:46 1 as well, right? That is not fixed, correct?

02:32:52 2 A. The output of the beamformer -- or, sorry, the output
02:32:56 3 of the beam selector may, from time to time, select a
02:33:00 4 different beam.

02:33:03 5 Q. So that's not fixed, right?

02:33:05 6 A. Yes, that's correct. It can -- it can select a
02:33:09 7 different beam.

02:33:13 8 Q. So when you were talking earlier about things being
02:33:16 9 fixed, coefficients being fixed, you were only talking
02:33:19 10 about the fixed beamforming component in that block called
02:33:24 11 fixed beamforming, right?

02:33:25 12 A. Yes, the coefficients in the FBF block, fixed
02:33:33 13 beamformer, do not change unless, as I noted, there is a
02:33:37 14 software update.

02:33:39 15 Q. But coefficients in other blocks like the adaptive
02:33:44 16 beamforming, output of the beam selector, those things
02:33:48 17 change, and some of them change continuously. Right?

02:33:51 18 A. Adaptive beamformer block has filter coefficients that
02:33:57 19 can change. The beam selector block does not have any
02:34:04 20 coefficients.

02:34:04 21 Q. But the output of the beam selector block can change,
02:34:09 22 right?

02:34:09 23 A. It can -- it can take -- it can output one of those six
02:34:14 24 incoming channels, and it may change from time to time in
02:34:20 25 selecting a different one of those six channels.

02:34:24 1 (Videoclip ends.)

02:34:26 2 THE COURT: Does that complete this witness by
02:34:29 3 deposition?

02:34:29 4 MR. FABRICANT: Yes, it does, Your Honor.

02:34:31 5 We have an additional witness by video deposition
02:34:33 6 that Ms. Park will announce to the Court.

02:34:37 7 THE COURT: How long is this additional deposition
02:34:39 8 witness?

02:34:40 9 MS. PARK: The next witness is 10 minutes, 54
02:34:43 10 seconds, and then we have an additional witness following.

02:34:46 11 THE COURT: All right. Let's proceed with this
02:34:48 12 next deposition witness at this time.

02:34:50 13 If you'll announce them into the record, please,
02:34:54 14 Ms. Park.

02:34:55 15 MS. PARK: Plaintiff calls by deposition Miriam
02:35:00 16 Daniel, vice president of Echo and Alexa devices at
02:35:04 17 Amazon.com.

02:35:05 18 Playtime for Plaintiff is 10 minutes, 54 seconds;
02:35:07 19 and playtime for Defendants is 45 seconds.

02:35:10 20 THE COURT: Please proceed.

02:35:10 21 MIRIAM DANIEL, PLAINTIFF'S WITNESS

02:35:11 22 PRESENTED BY VIDEO DEPOSITION

02:35:11 23 (Videoclip played.)

02:35:12 24 Q. Could you please state your name and location for the
02:35:15 25 record?

02:35:15 1 A. This is Miriam Daniel. I'm speaking over video from
02:35:24 2 California.
02:35:24 3 Q. Can you tell me where is it that you work?
02:35:26 4 A. I work at Amazon.
02:35:27 5 Q. Is that Amazon.com, Inc. LLC?
02:35:36 6 A. Yes.
02:35:36 7 Q. What is your title?
02:35:39 8 A. Vice president, Echo and Alexa devices.
02:35:43 9 Q. With respect to marketing a product for launch, how
02:35:46 10 does Amazon determine what marketing channels to utilize?
02:35:57 11 A. Our biggest marketing channel is actually our
02:36:07 12 Amazon.com retail site itself because of, you know, how
02:36:12 13 people come there to purchase things. But sometimes, in
02:36:16 14 addition to that, we might choose other channels, depending
02:36:23 15 on the product.
02:36:23 16 Q. What other channels might you choose?
02:36:30 17 A. For some products, we might sell through our retail
02:36:35 18 partners. That's a channel.
02:36:37 19 Q. Are there any other channels?
02:36:44 20 A. Again, it depends on what product you're talking about.
02:36:51 21 Q. Well, let's talk about the Echo devices. The Echo --
02:36:56 22 smart speaker Echo devices, what marketing channels other
02:36:59 23 than the Amazon.com retail site and partners would be
02:37:10 24 considered?
02:37:11 25 A. Even that's broad. We have different smart speakers,

02:37:16 1 and we don't employ all channels for all devices.

02:37:23 2 Q. With respect to the Alexa endpoint Echo devices, is it
02:37:32 3 fair to say that they all need to have microphones so that
02:37:37 4 Alexa can hear the words being spoken to her?

02:37:44 5 A. That is how we define endpoints, yes.

02:37:47 6 Q. Generally speaking, would you agree that it's important
02:37:50 7 that Alexa be able to hear the individual that's speaking
02:37:56 8 to her?

02:38:02 9 A. Yes.

02:38:02 10 Q. When a customer makes a voice -- a voice purchase
02:38:09 11 request or orders something through Alexa, is that customer
02:38:16 12 only able to purchase items sold by Amazon?

02:38:19 13 A. They are only able to purchase items sold through
02:38:32 14 Amazon retail.

02:38:33 15 Q. Is Amazon retail inclusive of third-party sellers?

02:38:44 16 A. Yes.

02:38:47 17 Q. Are customers only able to order products available
02:38:55 18 through Amazon Prime using Alexa?

02:38:59 19 A. I don't believe there's a restriction on that.

02:39:02 20 Q. And you also mentioned Alexa skills as being part of
02:39:06 21 the Alexa and Echo ecosystem; is that correct?

02:39:12 22 A. That is correct.

02:39:13 23 Q. And is it correct that there are probably too many
02:39:22 24 skills for you to identify?

02:39:24 25 A. There are more than 100,000 skills in Alexa.

02:39:29 1 Q. First of all, why was Amazon considering reducing the
02:39:34 2 cost of the Echo Dot?

02:39:37 3 A. Because we want to give the most affordable device to
02:39:42 4 our customers.

02:39:46 5 Q. What benefit does Amazon receive from offering a more
02:39:50 6 affordable device?

02:39:51 7 A. When you offer a more affordable device, more customers
02:39:58 8 can purchase the device.

02:39:59 9 Q. Why did Amazon want to drive the most volume rather
02:40:09 10 than generate the most profit?

02:40:10 11 A. What I would say is, as a talk exercise in every one of
02:40:17 12 these documents, we always look at different options and
02:40:21 13 see, you know, what options do we want to optimize for. So
02:40:26 14 this is more of a subject topic exercise.

02:40:29 15 And as I mentioned before, we actually ended up
02:40:32 16 maintaining our MSRP at 49.99. And, you know, this is
02:40:39 17 simply to say what would you trade off. You know, there's
02:40:43 18 multiple ways of looking at the same problem.

02:40:46 19 Q. But why was Amazon considering reducing the price and
02:40:50 20 choosing a pricing strategy expected to drive the most
02:40:53 21 volume?

02:40:53 22 A. I think Amazon, just like any business, would like to
02:41:01 23 have more customers adopt Alexa, and, you know, then we can
02:41:09 24 drive more adoption of Alexa across our customer base. And
02:41:13 25 any time there is a price reduction, there is potentially

02:41:17 1 sales elasticity.

02:41:23 2 Q. Why does Amazon want more customers to adopt Alexa?

02:41:28 3 A. We would like to delight more customers.

02:41:34 4 Q. Is there any business reasons that Amazon wants more
02:41:45 5 widespread adoption of Alexa?

02:41:47 6 A. Yes. I mean, there is customer reasons and business
02:41:53 7 reasons. We believe that Alexa is delightful, and, hence,
02:41:57 8 making Alexa available to all -- all of -- of our customers
02:42:02 9 is part of our responsibility, and we try to take actions
02:42:04 10 that will make it more available and affordable to all
02:42:07 11 segments of our customers.

02:42:09 12 And as we do that, as more customers adopt Alexa,
02:42:15 13 then we know that Alexa engagement grows. It's the same as
02:42:22 14 any -- maybe why Facebook would grow its community. Right?
02:42:29 15 We want more people to interact with Alexa; and as Alexa
02:42:34 16 interacts with more customers, Alexa's services actually
02:42:36 17 improve and get better, as well.

02:42:38 18 Q. Why does it matter to Amazon that engagement with Alexa
02:42:44 19 grows?

02:42:46 20 A. When engagement grows with Alexa, we can -- we do
02:42:57 21 several things. We know -- we -- that engagement tells us
02:43:05 22 how to improve the Alexa services, whether it is voice
02:43:12 23 recognition, whether it is how that service works, you
02:43:15 24 know, it's a -- kind of a cycle.

02:43:18 25 The more people interact with a specific skill,

02:43:21 1 then we -- the mission-learning algorithms and the AI
02:43:27 2 algorithms continue to get better with that engagement.
02:43:30 3 And so that is one big reason why we want to drive
02:43:32 4 engagement.

02:43:32 5 Q. Would you agree that the goal of any business is to
02:43:34 6 make money?

02:43:35 7 A. Yes.

02:43:35 8 Q. So as it pertains to making money, why is widespread
02:43:47 9 adoption of Alexa important to Amazon?

02:43:50 10 A. More customers purchase our devices, and those devices
02:43:55 11 drive engagement.

02:43:56 12 Q. Engagement of what?

02:44:01 13 A. Alexa and Alexa services.

02:44:04 14 Q. Is maximizing the long-term value important to Amazon?

02:44:09 15 A. Yes.

02:44:09 16 Q. Why?

02:44:20 17 A. I would say it is just as important as reducing costs
02:44:30 18 and passing that cost back to customers. Like if we can
02:44:33 19 reduce costs by a dollar, that means we can offer another
02:44:37 20 dollar's discount to customers, right?

02:44:42 21 And in doing that, you know, we have a chance of
02:44:48 22 retaining the customer for a longer period of time. You
02:44:50 23 know, over time, they're more satisfied customers, they are
02:44:54 24 loyal to Amazon, and that generates long-term value.

02:44:57 25 And so when you look at this long-term value,

02:45:00 1 there are lots of -- as I just explained to you, lots of
02:45:04 2 inputs that can change it. And so we try to optimize all
02:45:09 3 of those inputs and maximize long-term value, because it
02:45:13 4 means a highly satisfied customer who stays with us for a
02:45:16 5 longer period of time.

02:45:17 6 Q. How does Amazon define a customer?

02:45:20 7 A. A consumer who is looking to add convenience to their
02:45:31 8 lives by using one of our products and services.

02:45:35 9 Q. For the Alexa endpoint Echo devices, was Amazon's
02:45:43 10 online retail website the main sales channel?

02:45:50 11 A. Yes.

02:45:50 12 Q. What other channels are the Echo products sold in?

02:45:58 13 A. Our retail partners like Best Buy or Target.

02:46:02 14 Q. Is that both brick and mortar and online for those
02:46:15 15 retail partners?

02:46:17 16 A. Yes.

02:46:21 17 Q. Can you identify any other retail partners for the Echo
02:46:27 18 devices?

02:46:29 19 A. We have different retail partners in different
02:46:38 20 countries, so I couldn't name the others in the other
02:46:41 21 countries.

02:46:41 22 Q. In the United States.

02:46:43 23 A. Those are -- Home Depot might be a partner -- Home
02:46:55 24 Depot might be a partner. I'd have to go and confirm.

02:46:58 25 (Videoclip ends.)

02:46:58 1 THE COURT: Does that complete this witness by
02:47:00 2 deposition?

02:47:00 3 MR. FABRICANT: Yes, it does, Your Honor.

02:47:01 4 THE COURT: All right. Before we proceed with the
02:47:02 5 next witness for Plaintiff, we're going to take a short
02:47:05 6 recess, ladies and gentlemen.

02:47:06 7 If the members of the jury will simply close and
02:47:10 8 leave your notebooks in your chairs, follow all the
02:47:13 9 instructions I've given you, including not to discuss the
02:47:16 10 case among yourselves, and we'll be back shortly to
02:47:19 11 continue.

02:47:19 12 The jury is excused for recess.

02:47:26 13 COURT SECURITY OFFICER: All rise.

02:47:27 14 (Jury out.)

02:47:28 15 THE COURT: Be seated, please.

02:47:46 16 Mr. Fabricant, you have one additional deposition
02:47:50 17 witness; is that correct?

02:47:51 18 MR. FABRICANT: Yes, Your Honor.

02:47:52 19 THE COURT: Followed by your damages expert?

02:47:54 20 MR. FABRICANT: Yes, that's it. And then we -- we
02:47:56 21 will rest our case after the damages expert, Your Honor.

02:47:59 22 THE COURT: All right. Who will Defendants' first
02:48:01 23 witness be?

02:48:01 24 MR. HADDEN: Mr. Rohit Prasad from Amazon.

02:48:06 25 THE COURT: All right. Do you have an expected

02:48:10 1 length of time for direct examination?

02:48:12 2 MR. HADDEN: Under an hour.

02:48:13 3 THE COURT: All right. All right. Thank you for
02:48:15 4 that information, counsel.

02:48:16 5 We stand in recess.

02:48:17 6 COURT SECURITY OFFICER: All rise.

02:48:18 7 (Recess.)

02:48:21 8 (Jury out.)

02:48:23 9 COURT SECURITY OFFICER: All rise.

02:48:24 10 THE COURT: Be seated, please.

03:14:47 11 Plaintiff, are you prepared to call your next
03:14:56 12 witness?

03:14:57 13 MR. FABRICANT: Yes, Your Honor. Our -- our next
03:15:01 14 witness will be by video, and it runs approximately 22
03:15:04 15 minutes.

03:15:04 16 THE COURT: All right. Let's bring in the jury,
03:15:06 17 please.

03:15:06 18 COURT SECURITY OFFICER: All rise.

03:15:07 19 (Jury in.)

03:15:08 20 THE COURT: Please be seated.

03:15:37 21 Plaintiff, call your next witness.

03:15:42 22 MS. PARK: Plaintiff calls by deposition Enerino
03:15:55 23 Caruccio, vice president of financial analysis for Amazon
03:15:58 24 devices at Amazon.com.

03:16:00 25 Playtime time for Plaintiff is 20 minutes, 19

03:16:02 1 seconds; and playtime for Defendants is 1 minute, 14
03:16:06 2 seconds.

03:16:06 3 THE COURT: Please proceed with this witness by
03:16:09 4 deposition.

03:16:09 5 ENERINO CARUCCIO, PLAINTIFF'S WITNESS

03:16:11 6 PRESENTED BY VIDEO DEPOSITION

03:16:11 7 (Videoclip played.)

03:16:12 8 Q. Good morning. For the record, what is your full name
03:16:15 9 and city and state of residence?

03:16:16 10 A. Enerino Michael Caruccio, resident of Mercer Island,
03:16:25 11 Washington.

03:16:25 12 Q. By whom are you employed, Mr. Caruccio?

03:16:28 13 A. Amazon.com.

03:16:29 14 Q. When did you begin your employment with Amazon?

03:16:34 15 A. 2006.

03:16:40 16 Q. What was the title that you held when you first began
03:16:43 17 your employment at Amazon?

03:16:44 18 A. I was vice president of finance for global financial
03:16:49 19 planning and analysis.

03:16:50 20 Q. You were in the role of vice president of finance,
03:16:55 21 global financial planning and analysis from 2006 to 2012;
03:16:59 22 is that right?

03:16:59 23 A. That's correct.

03:16:59 24 Q. Mr. Caruccio, following your time as vice president of
03:17:11 25 finance for worldwide seller services, what was your next

03:17:13 1 role at Amazon?

03:17:14 2 A. I was the vice president of finance for the worldwide
03:17:16 3 consumer financial planning and analysis team.

03:17:19 4 Q. You remained in your role of vice president of finance,
03:17:24 5 worldwide consumer financial planning and analysis until
03:17:28 6 March 2017; is that correct?

03:17:30 7 A. That is correct.

03:17:38 8 Q. What is the next role at Amazon that you held?

03:17:41 9 A. The vice president of financial analysis for devices --
03:17:43 10 Amazon devices.

03:17:46 11 Q. Is that your current position at Amazon?

03:17:49 12 A. It is.

03:17:56 13 Q. I'm going to introduce Exhibit 6. This document was
03:18:00 14 produced by Amazon with beginning production number
03:18:09 15 AMZN0136033. What is DSI?

03:18:12 16 A. Downstream impact.

03:18:14 17 Q. How do you use that metric in your role as VP of
03:18:17 18 financial analysis for devices at Amazon?

03:18:20 19 A. Downstream impact is a concept methodology that
03:18:31 20 attempts to measure the change in a customer's purchase
03:18:45 21 behavior/engagement based on a specific purchaser event.

03:18:51 22 So within devices, we use the concept of
03:18:53 23 downstream impact when we talk about the -- the -- the
03:18:58 24 specific event of a purchase and -- and basically the
03:19:03 25 turning on a particular Amazon device, the downstream

03:19:10 1 impact of that purchase.

03:19:13 2 Q. What is the downstream impact of purchasing an Echo
03:19:18 3 smart speaker device?

03:19:19 4 A. In broad terms --

03:19:23 5 ATTORNEY: Objection, form.

03:19:24 6 A. Yeah, in very, very broad terms, it is the value that
03:19:32 7 Amazon derives from the future engagement of that consumer
03:19:37 8 in the various offerings and service of products of Amazon.

03:19:50 9 Q. What is DEV?

03:19:52 10 A. I don't know exactly what DEV stands for, but it's
03:19:57 11 another economic measure of this downstream impact.

03:20:03 12 Q. Could you turn to Page 6 of 8 of Exhibit 6, which is
03:20:10 13 also bearing production number ending in 136038?

03:20:16 14 A. Okay.

03:20:16 15 Q. Starting on that page, there is a glossary of terms.

03:20:24 16 A. Okay.

03:20:24 17 Q. DEV is defined on that page, correct?

03:20:31 18 A. Right. Downstream economic value, yes. Line 212.

03:20:37 19 Q. And continuing on to the next page, if you could refer
03:20:40 20 to that definition and let me know if that refreshes your
03:20:47 21 memory as to what DEV is inclusive of.

03:20:56 22 A. Okay. Yep.

03:20:57 23 Q. What is your understanding of what DEV measures?

03:21:01 24 A. DEV measures, again, the value -- the economic value to
03:21:07 25 Amazon, the downstream impact of a -- of a -- of a sale of

03:21:14 1 an Amazon device.

03:21:15 2 Q. I'm going to introduce Exhibit 8, which is a document
03:21:21 3 produced in native Excel format as AMZN0023425.

03:21:31 4 Mr. Caruccio, is it your understanding that Amazon
03:21:34 5 tracks data related to downstream economic value in the
03:21:37 6 ordinary course of business?

03:21:39 7 A. Yes.

03:21:45 8 Q. Is downstream economic value data reflected in
03:21:50 9 Exhibit 8?

03:21:51 10 A. It reads that it has DEV, economic value -- so I will
03:22:00 11 assume that it is, but I don't know for sure. I didn't
03:22:03 12 create the document.

03:22:04 13 Q. To your knowledge, does Amazon track downstream
03:22:07 14 economic value in the ordinary course of business?

03:22:10 15 A. Yes.

03:22:10 16 Q. How does Amazon track that information?

03:22:18 17 A. Various business and finance teams will view downstream
03:22:28 18 economic value for a variety of reasons. For example, when
03:22:40 19 we're considering investments in a particular service or
03:22:45 20 launching a new product, we will try to assess the
03:22:49 21 downstream economic value associated with that product or
03:22:56 22 service.

03:22:57 23 When we're evaluating investments in an entire
03:23:01 24 product category, we'll take a look at the downstream
03:23:06 25 economic value of that entire category to determine how --

03:23:09 1 what should we invest in, in relation to the business.

03:23:13 2 Q. I'm going to introduce Exhibit 10, document with

03:23:20 3 beginning with production number AMZ0130963. Under the

03:23:20 4 heading Strategy 4, do you see the paragraph beginning with

03:23:33 5 "pricing and bundles strategy"?

03:23:33 6 A. Yes.

03:23:33 7 Q. As it's used in this paragraph, what does ASP stand

03:23:37 8 for?

03:23:38 9 A. Average selling price.

03:23:43 10 Q. This document states: Over the past two years, our ASP

03:23:48 11 has declined due to lower priced products and higher

03:23:53 12 promotional activity, both from our own proactive promotion

03:23:57 13 planning and through reactive price matching.

03:24:01 14 Is that correct?

03:24:02 15 A. That's correct.

03:24:02 16 Q. And it indicates that the ASP in 2017 was \$61, trending

03:24:09 17 to \$57 in 2018, and projecting \$46 in 2019. Is that

03:24:15 18 correct?

03:24:15 19 A. That's correct.

03:24:15 20 Q. Later in the paragraph it states: Our promo strategy

03:24:25 21 continues to prioritize price competitiveness and enabling

03:24:30 22 growth through lower ASP, as well as driving multi-device

03:24:37 23 HHF through multi-packs. That's in the center. Do you see

03:24:42 24 that?

03:24:42 25 A. Yes.

03:24:42 1 Q. Based on your experience at Amazon and your experience
03:24:45 2 in your current role, do you have an understanding of what
03:24:50 3 it means to enable growth through lowering ASP?

03:24:55 4 A. Yes, I have a general understanding of what that means.

03:24:58 5 Q. What is your understanding?

03:24:59 6 A. That by maintaining lower ASP, or more specifically
03:25:10 7 price competitive ASP, it will drive further sales of our
03:25:13 8 products.

03:25:14 9 Q. The next sentence states: For bundles, we will pursue
03:25:21 10 high volume strategic SH bundles to support our MSS goals
03:25:26 11 in a marketplace where Google continues to push aggressive
03:25:30 12 free GHM offers.

03:25:33 13 Do you see that?

03:25:33 14 A. Yes.

03:25:34 15 Q. Do you have an understanding of what that sentence is
03:25:39 16 referring to?

03:25:39 17 A. Yes.

03:25:43 18 Q. What does it mean?

03:25:47 19 A. That we will look to focus on products that we consider
03:25:57 20 strategic smart home bundles to drive our market segment
03:26:04 21 share growth.

03:26:07 22 Q. What does profitable for Amazon mean to you?

03:26:14 23 A. Well, there's -- profit is measured by our generally
03:26:24 24 accepted accounting principles, which is reflected in the
03:26:30 25 financials as we would indicate as part of our normal

03:26:33 1 course of business that we record every year.

03:26:37 2 And then there's profitable when we consider the
03:26:42 3 economic value that Amazon receives as a company from --
03:26:47 4 you know, downstream in tech, downstream economic value
03:26:59 5 from an event or a sale at this point in time.

03:27:02 6 So there's two different ways of looking at it.

03:27:04 7 Q. Under the second method of measuring profitability that
03:27:09 8 you described related to downstream economic value, has the
03:27:18 9 bundled sales strategy been profitable for Amazon?

03:27:22 10 A. I don't know for sure.

03:27:23 11 Q. What do you know with respect to the profitability of
03:27:27 12 that strategy?

03:27:32 13 A. As it relates to downstream economic value?

03:27:37 14 Q. Yes.

03:27:37 15 A. I do know that, based on the forecasting models, the
03:27:43 16 analysis, what we try to predict the future with certain
03:27:48 17 error bars, that the bundling strategy would be a positive
03:27:58 18 or profitable strategy for the company.

03:28:00 19 Q. I'm going to introduce Exhibit 11, which is a document
03:28:08 20 produced with Production No. AMZN0122376.

03:28:21 21 Do you have an understanding as to whether Amazon
03:28:23 22 maintains data related to sales of voice purchasing through
03:28:30 23 Alexa on the Amazon devices.

03:28:34 24 A. Yes, I believe they're -- that Amazon tracks that
03:28:37 25 information, yes.

03:28:38 1 Q. Referring to Exhibit 11, do you have an understanding
03:28:43 2 as to whether this document reflects data related to voice
03:28:46 3 purchasing through Alexa on the Echo devices?

03:28:50 4 A. Again, I -- I can't know for sure. It appears to, but
03:28:57 5 I don't know for sure.

03:29:00 6 Q. Referring to Exhibit 11, do you have an understanding
03:29:03 7 of what GMS in this document stands for?

03:29:09 8 A. Yes.

03:29:10 9 Q. What is GMS?

03:29:12 10 A. Gross merchandise sales.

03:29:14 11 Q. Mr. Caruccio, how does Amazon obtain downstream
03:29:19 12 economic value from sales of the Echo devices?

03:29:23 13 A. It's -- we work with our economic team. We have a -- a
03:29:37 14 team of economists that use models that -- you know,
03:29:47 15 economic models to come up with the value of a device,
03:29:51 16 purchase, engagement over the life of the product. It's --
03:29:55 17 it's an economic calculation. I don't know the specifics
03:29:58 18 of it.

03:30:01 19 Q. When you say engagement with a device, what are you
03:30:04 20 referring to?

03:30:04 21 A. Well, when somebody actually turns the device on and
03:30:14 22 starts using it.

03:30:14 23 Q. What types of engagement would lead to downstream
03:30:18 24 economic value?

03:30:18 25 A. Well, for example, if you purchase a -- a tablet, the

03:30:34 1 fact that you have the tablet in and of itself doesn't do
03:30:37 2 anything.

03:30:38 3 If you turn it on and start watching videos or
03:30:42 4 start surfing the web or downloading apps, all those
03:30:47 5 engagements have downstream value to Amazon; shopping on
03:30:52 6 the website. It depends on what you do with the device
03:30:58 7 once you start engaging with it.

03:31:01 8 Q. What types of engagements lead to downstream economic
03:31:05 9 value for the Echo devices?

03:31:10 10 A. The ones that come to mind are shopping on Amazon,
03:31:13 11 actually using the device to make an Amazon purchase, which
03:31:17 12 is delivery, purchasing video that's available on Amazon,
03:31:22 13 downloading or renting a movie, purchasing or downloading
03:31:35 14 music that's available through your subscriptions. Those
03:31:44 15 are the ones that come to mind.

03:31:45 16 Q. Does Amazon receive downstream economic value for
03:31:50 17 earlier generations of the Echo devices?

03:31:54 18 A. Earlier devices, meaning a device that I sold years
03:31:58 19 ago?

03:31:59 20 Q. Yes.

03:32:00 21 A. Yeah, there's some downstream economic value as long as
03:32:05 22 the customer is still engaging with the device.

03:32:10 23 Q. Does Amazon measure customer engagement?

03:32:17 24 A. We -- we measure how the cust -- yes, we measure how
03:32:24 25 the customer engages with the device, yes.

03:32:27 1 Q. How?

03:32:27 2 A. We can tell when a -- when a customer's turned on the
03:32:38 3 device. We can tell when a customer has made a purchase of
03:32:43 4 a video. We can tell when a customer has made a purchase
03:32:46 5 of a -- used the Amazon device to shop with. We can -- we
03:32:53 6 can -- we can measure the times that a customer actually
03:32:57 7 uses the device for a purchase or rental.

03:33:03 8 Q. What is Amazon's revenue strategy for the Echo devices
03:33:11 9 as it relates to the Amazon ecosystem as a whole?

03:33:16 10 A. The overall strategy is to -- to increase Amazon
03:33:25 11 customers' engagement with the entire Amazon ecosystem
03:33:34 12 through our devices for the Echo devices.

03:33:35 13 Q. What component of the Amazon ecosystem do customers
03:33:49 14 engage with through the Echo devices?

03:33:52 15 A. Watching video on Amazon, downloading apps, surfing the
03:34:03 16 web on Amazon, listening to music on Amazon.

03:34:10 17 Q. What is Amazon's market share -- market share strategy
03:34:16 18 for the Echo devices?

03:34:19 19 A. To increase the number of households that have an
03:34:29 20 Echo -- an Echo device so we can increase customers'
03:34:33 21 engagement with the Amazon ecosystem.

03:34:41 22 Q. For the Amazon devices' business unit, what are the
03:34:45 23 main cost centers?

03:34:46 24 A. The Amazon devices. The main cost centers would be the
03:34:58 25 bill of materials, which would include all of the material

03:35:01 1 that goes into making a device; the labor associated with
03:35:05 2 the manufacture, assembly, distribution of that device; the
03:35:28 3 supply chain costs to store, ship, you know, deliver the
03:35:33 4 device to the customer; marketing the device; any ongoing
03:35:46 5 capital expenditures required to produce the units; the
03:35:52 6 cost of payments to process payments the customers make to
03:36:03 7 purchase the device; our server costs, server expense for
03:36:07 8 the Alexa services that the device is run on; our customer
03:36:22 9 service that we have that engages with customers when
03:36:35 10 buying a device; administrative costs related to the
03:36:39 11 development, sales, and just general support of the Echo
03:36:53 12 business; and I guess I'm -- the other thing would be some
03:36:57 13 tooling and selling costs that we would incur to sell the
03:37:02 14 devices. Just kind of off the top of my head.

03:37:10 15 Q. What portion of those costs, approximately, pertains
03:37:14 16 specifically to the Echo devices?

03:37:17 17 A. All of those costs have an element that directly relate
03:37:20 18 to the Echo devices.

03:37:21 19 Q. Looking at Exhibit 11, Mr. Caruccio, what does units
03:37:27 20 shipped refer to?

03:37:27 21 A. Those would be the units of items purchased through the
03:37:38 22 voice shopping -- direct voice, number of units.

03:37:42 23 Q. And to confirm, this is data in Exhibit 11 that Amazon
03:37:56 24 collects in the ordinary course of business?

03:37:58 25 A. Yes.

03:37:58 1 (Videoclip ends.)

03:38:05 2 THE COURT: Does that complete this witness by
03:38:07 3 deposition?

03:38:07 4 MR. FABRICANT: Yes, it does, Your Honor.

03:38:08 5 THE COURT: All right. Call your next witness.

03:38:11 6 MR. FABRICANT: Your Honor, we call to the stand
03:38:12 7 Alan Ratliff.

03:38:13 8 THE COURT: All right. Mr. Ratliff, if you'll
03:38:16 9 come forward and be sworn, please.

03:38:19 10 (Witness sworn.)

03:38:33 11 THE COURT: Please come around, have a seat on the
03:38:35 12 witness stand.

03:38:36 13 You may go to the podium, counsel. Are there
03:38:54 14 binders to distribute for this witness?

03:38:56 15 MR. LAMBRIANAKOS: Yes, Your Honor.

03:38:58 16 THE COURT: Let's do that next.

03:39:23 17 THE WITNESS: Good afternoon, Your Honor.

03:39:25 18 THE COURT: All right. Counsel, you may proceed
03:39:27 19 with your direct examination.

03:39:29 20 MR. LAMBRIANAKOS: Thank you, Your Honor.

03:39:29 21 ALAN RATLIFF, PLAINTIFF'S WITNESS, SWORN

03:39:29 22 DIRECT EXAMINATION

03:39:32 23 BY MR. LAMBRIANAKOS:

03:39:32 24 Q. Mr. Ratliff, please introduce yourself to the jury.

03:39:35 25 A. Good afternoon. My name is Alan Ratliff. I live in

03:39:38 1 Houston, Texas. I'm a partner in a consulting firm called
03:39:42 2 StoneTurn Group. We have got about a dozen offices between
03:39:47 3 the U.S. and overseas.

03:39:48 4 The type of consulting we provide includes
03:39:51 5 financial investigations, evaluations, serving as experts
03:39:56 6 in litigation, certain types of government regulatory
03:40:00 7 investigation/consulting.

03:40:02 8 I'm married, my wife's name is Trisha. We've been
03:40:06 9 married about a little over 30 years. And she's an
03:40:09 10 assistant principal for a school for low-income kids in
03:40:15 11 East Houston.

03:40:15 12 Q. What was your assignment in this case?

03:40:17 13 A. To determine the amount of damages that Amazon would
03:40:20 14 owe to Vocalife if you, the jury, determine that there's
03:40:25 15 been infringement of the '049 patent, and that that patent
03:40:28 16 is not invalid.

03:40:30 17 So in the course of this, I'm going to assume
03:40:33 18 those things are true, in order to give you my damages
03:40:37 19 opinions, but you still have to determine those things.

03:40:39 20 Q. Did you prepare some demonstrative slides to assist in
03:40:42 21 your presentation?

03:40:43 22 A. I did.

03:41:02 23 Q. Mr. Ratliff, tell the jury about your education.

03:41:05 24 A. I did my undergraduate and graduate degrees at Baylor
03:41:11 25 University, business administration, accounting and tax.

03:41:14 1 And then I did my law degree at Southern Methodist
03:41:17 2 University.

03:41:17 3 Q. What relevant certifications do you have?

03:41:20 4 A. I'm a certified public accountant. I've been so a
03:41:23 5 little over 30 years. I'm a licensed attorney, and I've
03:41:26 6 been a licensed attorney for a little over 25 years.

03:41:30 7 In addition to that, through some national
03:41:32 8 professional organizations, I have certifications in
03:41:37 9 financial forensics, which would be the field of expertise
03:41:40 10 that I'm applying in this case, as well as global
03:41:45 11 management accounting and also patent valuation.

03:41:48 12 Q. Mr. Ratliff, what about teaching, writing, and
03:41:57 13 professional speaking in your areas of expertise?

03:42:00 14 A. So before I left Baylor, I spent a year on the
03:42:05 15 accounting faculty teaching there. While I was in law
03:42:08 16 school, I taught first year legal writing and research to
03:42:12 17 first year law students.

03:42:14 18 And then from that point, while I was practicing
03:42:17 19 law and for a few years after I moved to consulting, I was
03:42:22 20 an adjunct professor at the South Texas College of Law in
03:42:26 21 Houston teaching some tax litigation courses there, and
03:42:30 22 then also at the University of Houston, both in the
03:42:32 23 undergraduate business school and in the law school, as
03:42:36 24 well.

03:42:38 25 In addition to that, I've spoken on patent damages

03:42:43 1 being -- as a guest lecturer in courses offered at Boston
03:42:48 2 University, Fordham University up in New York City, UT here
03:42:53 3 in Austin, and then a trademark seminar course at
03:42:58 4 University -- or at Virginia Tech, rather.

03:43:01 5 And then, periodically two, three times a year, I
03:43:04 6 speak on damages or expert issues or valuation often
03:43:08 7 related to patent and intellectual property at conferences
03:43:12 8 that are attended by lawyers and other similar
03:43:15 9 professionals. And then I also periodically write articles
03:43:21 10 on similar subjects.

03:43:26 11 Q. What professional services and industry experience do
03:43:31 12 you have that's relevant to this case?

03:43:32 13 A. So quick background. After I left Baylor, I worked for
03:43:36 14 a large public accounting firm. You've heard the names of
03:43:41 15 these kind of companies, like Deloitte, Pricewaterhouse,
03:43:45 16 places like that.

03:43:46 17 So I worked in public accounting and then I went
03:43:49 18 back to law school at SMU. And then I clerked for federal
03:43:51 19 judge, and then I practiced law in Houston.

03:43:54 20 About five, six years into that, I sort of decided
03:43:57 21 to merge my backgrounds, and I became a consultant doing
03:44:01 22 forensic accounting and working as an expert witness in
03:44:04 23 litigation, as well as valuation and other types of
03:44:07 24 transaction consulting services, including licensing. And
03:44:09 25 that's what I continue to do today, and I've been doing

03:44:12 1 that for about 20 years.

03:44:13 2 From an industry standpoint, I've worked in a lot
03:44:16 3 of different industries, in terms of being hired as a
03:44:19 4 consultant or an expert, but particular to this case, where
03:44:23 5 you're dealing with, essentially with e-commerce, online
03:44:29 6 business, and communication devices like the Echo and Alexa
03:44:32 7 devices you've heard about, I've worked on other projects
03:44:36 8 involving smart speakers, smart home technology,
03:44:43 9 smartphones, tablets, and similar devices in matters
03:44:47 10 involving Apple, Google, Microsoft, Samsung, T-Mobile,
03:44:53 11 Ericsson, Motorola, and several others.

03:44:56 12 Q. How many cases have you worked on as a patent damages
03:44:58 13 expert?

03:44:59 14 A. I've lost track a little bit, but I, you know, can
03:45:04 15 account for somewhere between 175 and 200 cases where I at
03:45:09 16 least wrote a report.

03:45:11 17 Q. And what about patent licensing and valuation projects?

03:45:14 18 A. So back when I was a lawyer, I did some licensing as a
03:45:20 19 lawyer, negotiated some licenses for clients. As I moved
03:45:25 20 into consulting, I had the opportunity to continue to do
03:45:29 21 some of that work, and then also started doing valuation
03:45:33 22 assignments related to patents and other intellectual
03:45:36 23 property.

03:45:36 24 And then I've also worked with clients who wanted
03:45:40 25 to license their patents or have parties contact them about

03:45:43 1 licensing patents, and worked on those kind of projects, as
03:45:47 2 well.

03:45:47 3 Ones that weren't related to litigation where I
03:45:51 4 would be an expert like I am today, probably in the
03:45:54 5 neighborhood of about 50 of those kinds of projects.

03:45:59 6 Q. Have you negotiated and been part of a team negotiating
03:46:02 7 licenses?

03:46:02 8 A. Yes. Approximately two dozen times where I've actually
03:46:06 9 negotiated, been part of the team or done the economic
03:46:10 10 analysis to support those negotiations.

03:46:11 11 Q. What other relevant professional experience do you
03:46:15 12 have?

03:46:15 13 A. In addition to that, I've served as a special master in
03:46:19 14 an international licensing dispute in the District of
03:46:25 15 Maryland. I've also served as an arbitrator in
03:46:30 16 intellectual property and contract disputes, including in
03:46:32 17 the Southern District of Texas in Houston, as well as in
03:46:36 18 some state courts.

03:46:37 19 And then, finally, as we already mentioned, I
03:46:41 20 participated in the negotiation of licenses.

03:46:43 21 MR. LAMBRIANAKOS: Your Honor, at this time,
03:46:44 22 Plaintiff offers Alan Ratliff as a patent damages expert.

03:46:50 23 THE COURT: Is there objection?

03:46:51 24 MR. DACUS: Your Honor, we have no objection to
03:46:52 25 Mr. Ratliff's qualifications.

03:46:52 1 THE COURT: Then, without objection, the Court
03:46:52 2 will recognize this witness as an expert in the designated
03:46:53 3 fields.

03:46:54 4 Please continue, counsel.

03:46:56 5 MR. LAMBRIANAKOS: Thank you.

03:46:56 6 Q. (By Mr. Lambrianakos) Mr. Ratliff, what did you
03:47:01 7 consider in reaching your opinions in this case?

03:47:03 8 A. So you've probably gathered already as you see the
03:47:09 9 screen pop up with all these documents and all these big
03:47:13 10 numbers, that there were quite a few pieces of paper
03:47:18 11 electronically or otherwise exchanged by the parties in
03:47:20 12 this case.

03:47:21 13 Not all of them are relevant to damages, but my
03:47:23 14 paralegal tells me that we had 7,000 pages of documents
03:47:28 15 that we were provided that me and my team -- I had three
03:47:31 16 other people that work with me on this project -- reviewed
03:47:35 17 for purposes of putting together damages opinions.

03:47:38 18 There were also legal filings in the case that we
03:47:41 19 reviewed, depositions and declarations, and you've heard
03:47:48 20 some of those played in court Thursday, Friday, and today.

03:47:52 21 There were technical reports put together by the
03:47:54 22 parties. You heard Mr. McAlexander testifying today. He
03:47:56 23 had also done reports in the case.

03:47:59 24 And then we did outside research on our own,
03:48:01 25 including on smart speakers related to the industry and the

03:48:05 1 market.

03:48:05 2 And then, of course, over the last 20 years of
03:48:08 3 doing this kind of work, I've gotten training, experience,
03:48:12 4 and knowledge from past projects.

03:48:13 5 Q. Assuming for now that the jury finds in favor of
03:48:20 6 Vocalife, what damages are available in a patent case?

03:48:21 7 A. So the slide that's been put up there is an excerpt
03:48:27 8 from what we typically refer to as the patent damages
03:48:30 9 statute.

03:48:31 10 And you can see the damages are supposed to be
03:48:35 11 adequate to compensate for the infringement, but in no
03:48:40 12 event less than a reasonable royalty for the use made of
03:48:43 13 the invention by the infringer.

03:48:45 14 And we're going to talk a little more about that
03:48:48 15 royalty.

03:48:48 16 Q. Are there specific types of damages that fit within the
03:48:54 17 definition that we just saw?

03:48:55 18 A. There are a number of types, but in this particular
03:48:58 19 case, both sides have put forward damages opinions based on
03:49:05 20 a reasonable royalty. It is the most common form of
03:49:10 21 damages or award, the amount that you ask to award, in
03:49:15 22 patent damages cases.

03:49:16 23 The comparison I would give you and some of you I
03:49:21 24 know from your business backgrounds or just being around
03:49:24 25 Texas, you've heard the phrase royalty before, because

03:49:29 1 we've got a lot of oil and gas down here, and you hear
03:49:32 2 about oil and gas royalties.

03:49:33 3 The kind of royalty we're talking about here is a
03:49:36 4 fee that somebody would pay to have the right to use the
03:49:39 5 claims of the patent. And you've seen all about how
03:49:42 6 patents are put together, and that they have claims.

03:49:45 7 And so the analogy that I would give you is sort
03:49:48 8 of like somebody else has property, and you want to use it,
03:49:51 9 and that person says, fine, you can use it for a period of
03:49:54 10 time, but you have to pay a fee for it. That's what a
03:49:58 11 royalty is.

03:49:59 12 Q. What is a reasonable royalty in a patent case?

03:50:01 13 A. Ultimately, the goal of the reasonable royalty is to
03:50:06 14 compensate the patentholder, in this case Vocalife, for the
03:50:12 15 use of its invention by Amazon. And the way -- this is a
03:50:15 16 concept -- the way that we measure that is to try to
03:50:20 17 understand the value that that patent contributed to the
03:50:22 18 value that Amazon got out of it by using it.

03:50:26 19 Q. Is that a simple calculation, Mr. Ratliff?

03:50:29 20 A. No. The concept is pretty straightforward. Hopefully,
03:50:34 21 that makes sense to you. But as you've already heard, and
03:50:37 22 I don't think there's any dispute about this in this case,
03:50:40 23 so -- so I say it with that confidence, most patents are
03:50:45 24 improvements.

03:50:47 25 Most patents don't invent an entire product or an

03:50:51 1 entire business. But they make improvements. And where
03:50:55 2 there's significant improvements, you're trying to
03:50:57 3 determine what contribution those improvements made to the
03:51:01 4 whole value of that product or business.

03:51:06 5 Q. How did you do that in this case?

03:51:09 6 A. The next slide will give you a little more of a visual.
03:51:13 7 And I'm totally mindful it's late in the afternoon, you've
03:51:16 8 heard a lot of technical testimony today, and then here
03:51:19 9 comes the numbers guy.

03:51:20 10 So I know that's not what you're looking forward
03:51:24 11 to. So I'm trying to use a lot of diagrams, and I've saved
03:51:28 12 all the numbers to the end. So, hopefully, that will make
03:51:30 13 it a little less painful.

03:51:32 14 So the very first bubble I put there is what
03:51:35 15 you're going to hear from my testimony and you already
03:51:38 16 heard from Mr. Caruccio, is that Amazon determines this
03:51:42 17 economic value. And they ultimately describe it in the
03:51:44 18 documents as incremental profits that they attribute to the
03:51:48 19 sales and use of these infringing devices.

03:51:55 20 Now, I use the word "incremental" there. The way
03:51:57 21 Amazon uses it in its documents is it's comparing people
03:52:01 22 who own Echo devices to people who don't own Echo devices,
03:52:05 23 and they actually quantify the extra profits that they make
03:52:08 24 from those customers that have Echo devices over and above
03:52:15 25 what they'd make from customers who didn't.

03:52:15 1 But, again, as I just said, we know that the value
03:52:19 2 of the patents in this case, they contribute to that, but
03:52:19 3 they don't cover all of that.

03:52:20 4 So that next bubble is showing you that my next
03:52:24 5 step was, to try to figure out the value that was
03:52:30 6 specifically related to the device itself, as opposed to
03:52:32 7 the many other facets of Amazon's business which you've
03:52:36 8 already heard some about.

03:52:38 9 But we're not done yet there because there's one
03:52:41 10 more step, because the law requires us to then look at
03:52:43 11 the -- the thing that is making the contribution and sort
03:52:47 12 out the patented contribution from the non-patented
03:52:50 13 contribution.

03:52:51 14 So even when we're looking at that Echo Dot
03:52:55 15 device, there are certain aspects of that device that are
03:52:58 16 patented and certain elements of that device that aren't
03:53:01 17 patented.

03:53:02 18 And with the help of the technical expert,
03:53:06 19 Mr. McAlexander, I've done an estimate then of the patented
03:53:09 20 versus non-patented portion. And that leads us to the
03:53:15 21 reasonable royalty.

03:53:15 22 Q. Is there a term that's used to describe the process of
03:53:17 23 going from the larger amount of profit, on the left side of
03:53:20 24 your slide, down to the profits that are associated with
03:53:25 25 the use of the patent?

03:53:27 1 A. Yes, it's called apportionment.

03:53:30 2 Q. Are there any other rules of the road we need to
03:53:33 3 discuss?

03:53:33 4 A. No, I think we're ready to get into the process I went
03:53:36 5 through.

03:53:36 6 Q. What framework is generally accepted for determining a
03:53:39 7 reasonable royalty?

03:53:39 8 A. So the most frequently used and a generally accepted
03:53:45 9 approach to determining a royalty is what's called the
03:53:49 10 hypothetical license negotiation.

03:53:51 11 It's where we imagine that Vocalife and Amazon sat
03:53:56 12 down across the table from each other, and there were no
03:54:00 13 disputes over whether the '049 patent was valid, no
03:54:06 14 disputes over whether it would be infringed by the Echo
03:54:08 15 devices, and no dispute on whether it was enforceable.

03:54:12 16 And the parties would reach an agreement where
03:54:15 17 Vocalife agreed to let Amazon use the patented claims, and
03:54:17 18 Amazon agreed to pay a fee or a royalty for that use.

03:54:22 19 Now, we know that didn't actually happen. There
03:54:24 20 wasn't actually this negotiation. There isn't any
03:54:29 21 agreement, and that's why we're here today.

03:54:31 22 But we use that as a framework so that the parties
03:54:34 23 and their experts can provide you with evidence of the kind
03:54:38 24 of information that businesses will normally use to try to
03:54:43 25 figure out what to do when they're trying to negotiate a

03:54:47 1 license and what amount of fee to pay.

03:54:51 2 So the evidence you're going to hear me talking
03:54:53 3 about today are going to be the kinds of things that
03:54:55 4 businesses would normally consider in reaching an -- an
03:54:59 5 agreement.

03:55:00 6 Q. Is this the same methodology that Amazon's expert used?

03:55:03 7 A. Yes.

03:55:04 8 Q. What information do companies in the business world
03:55:13 9 normally consider in reaching a license agreement?

03:55:15 10 A. So it's not going to surprise you. If you were trying
03:55:19 11 to do a license agreement with someone, you might consider
03:55:22 12 other license agreements that might be similar to the one
03:55:25 13 you're trying to do.

03:55:26 14 Obviously, you're going to consider whether the
03:55:27 15 particular product is profitable, whether it's been
03:55:30 16 commercially successful. You're going to consider things
03:55:36 17 like what -- what level of contribution the patent's making
03:55:39 18 to that commercial success.

03:55:41 19 And, in fact, there's a case that's actually -- I
03:55:45 20 guess it's turning 50 years old or getting ready to turn 50
03:55:49 21 years old called Georgia-Pacific, which set forth 15
03:55:55 22 factors which Courts have adopted for use in patent cases
03:55:58 23 to help determine a royalty, and I've summarized those 15
03:56:02 24 factors for you on this slide.

03:56:04 25 Q. Do you have first-hand experience in negotiating

03:56:07 1 licenses?

03:56:08 2 A. Yes.

03:56:08 3 Q. Including related to devices used in e-commerce?

03:56:12 4 A. Yes.

03:56:12 5 Q. Are all 15 of these factors important in every case?

03:56:16 6 A. No. In fact, usually, it's a few factors ended up
03:56:22 7 being more important than the rest, and because the factors
03:56:25 8 relate to a number of topics but some of those topics
03:56:31 9 overlap, I typically try to organize them into a few
03:56:35 10 categories and discuss them category-by-category.

03:56:37 11 Q. Are these the categories you just identified?

03:56:40 12 A. Yes. So, generally, we're going to talk about some
03:56:42 13 licensing information, and that's our first topic. And
03:56:45 14 then we'll talk about commercial information, technology
03:56:49 15 information, and then other industry and market
03:56:52 16 information.

03:56:55 17 Q. What considerations relevant to the royalty are
03:57:07 18 addressed by the licensing factors?

03:57:09 19 A. So I think as you look at these, they'll all sort of
03:57:14 20 make sense to you, right? If Vocalife had actually already
03:57:17 21 licensed the '049 patent, if Amazon had licensed some other
03:57:20 22 technology that was similar to the '049 patent, if either
03:57:23 23 of the parties have sort of normal or desired licensing
03:57:29 24 approaches or practices.

03:57:30 25 And then, of course, sometimes there's information

03:57:33 1 from the industry that helps us understand how parties
03:57:36 2 might license in a particular case.

03:57:37 3 Q. What did you consider and conclude about any Vocalife
03:57:42 4 and Amazon licenses?

03:57:43 5 A. So Vocalife has not yet licensed the '049 patent. And
03:57:49 6 Amazon did not have any comparable licenses. They did
03:57:53 7 produce some licenses. But had Mr. McAlexander looked at
03:57:58 8 the technology involved. And he didn't find any of them
03:58:01 9 comparable, and they were settlements, so they weren't
03:58:04 10 situations where Amazon agreed that the patent was valid
03:58:08 11 and infringed. Instead, it was just a negotiated deal
03:58:11 12 where they settled.

03:58:12 13 Q. What did Amazon's financial expert determine on this
03:58:16 14 subject?

03:58:16 15 A. Same as me, that none of these licenses were
03:58:19 16 comparable.

03:58:20 17 Q. Was there anything about the normal terms and
03:58:24 18 conditions of the parties' licenses that was important to
03:58:26 19 your determination of a reasonable royalty?

03:58:28 20 A. Again, it was mostly the -- the absence of information.
03:58:34 21 Dr. Li, certainly, if he was going to license his patents
03:58:38 22 to anyone who was going to actually use them in making a
03:58:42 23 product, his preference was to receive a fee for each one
03:58:45 24 of those products. We'll call that a per unit royalty or a
03:58:51 25 running royalty, because if they keep selling products,

03:58:55 1 they keep paying a royalty.

03:58:57 2 Amazon, on the other hand, by deposition testified
03:58:59 3 that their preference, when they do licensing, if they can,
03:59:01 4 is just try to pay an amount upfront, one time. That's
03:59:06 5 called a lump-sum license. Based on the documents in the
03:59:11 6 case -- as I said, there weren't really any comparable
03:59:14 7 licenses because they were just settlements.

03:59:16 8 What I can tell you is most of those involved just
03:59:19 9 a settlement fee. A few of them, though, did have
03:59:22 10 provisions that involved either paying a percent of sales
03:59:25 11 or for a fixed number of units a fee, so more like a per
03:59:29 12 unit. So there was at least some evidence of both kinds of
03:59:34 13 practices.

03:59:34 14 Q. Were there any customary royalty rates or structures
03:59:41 15 for licensing similar technology in the industry?

03:59:41 16 A. Didn't find any what I'd call industry licenses that
03:59:44 17 were comparable. Again, based on my experience, I know
03:59:48 18 when it comes to these kind of devices, running royalties
03:59:51 19 are still the most frequent, but, again, there's no one set
03:59:56 20 way that those agreements are done.

03:59:58 21 Q. Any other licensing considerations we need to discuss?

04:00:01 22 A. No.

04:00:01 23 Q. What factors did you consider next?

04:00:05 24 A. So we next move to the commercial factors.

04:00:12 25 Q. What considerations relevant to the royalty are

04:00:15 1 addressed by the commercial factors?

04:00:16 2 A. So, here again, I provided you a list which are based
04:00:22 3 on various parts of the Georgia-Pacific factors that I
04:00:26 4 listed all 15 on a few minutes ago.

04:00:28 5 Again, it's the kind of things you would expect.

04:00:31 6 How profitable was the product? How much of the profit
04:00:35 7 related to the patent? How commercially successful and
04:00:38 8 popular were the products? When you bought the products,
04:00:43 9 then did that lead to other sales over and above the
04:00:46 10 product itself? And just how extensive was the use of the
04:00:50 11 patent in those products?

04:00:51 12 Q. Which of these factors were most useful to you in
04:00:57 13 determining the royalty in this case?

04:00:59 14 A. You'll see as I go through in more detail some of the
04:01:03 15 information from the case, but generally being able to see
04:01:10 16 the additional value that came to Amazon as a result of
04:01:13 17 having sold these devices, the additional sales they made,
04:01:17 18 the extent of the annual sales of these devices being very
04:01:25 19 significant, and just how successful and popular these
04:01:30 20 devices were, were influential.

04:01:33 21 Q. How does Amazon profit from the use of the '049 patent?

04:01:37 22 A. So in this slide I've -- I've put an excerpt, and I'm
04:01:40 23 going to sort of build off the video deposition testimony
04:01:45 24 that you heard right before and right after the break.

04:01:49 25 You heard from Ms. Daniels and you heard from

04:01:52 1 Mr. Caruccio. And consistent with what they explained, the
04:01:54 2 top priority, the strategic priority for Amazon was
04:02:00 3 customer engagement. The more they engaged, the more loyal
04:02:04 4 they were, the more they spent, and the more profits they
04:02:09 5 made. And these devices were the key focus of trying to
04:02:12 6 gain that customer engagement.

04:02:16 7 So I put the excerpt there, and you can read it.
04:02:16 8 But just to highlight for you, the key element of the
04:02:19 9 strategy was driving the flywheel of Amazon's business.
04:02:23 10 All of the other things that Amazon does besides devices,
04:02:27 11 from its online retail merchandise sales, to its music, its
04:02:34 12 videos, other apps, and things like that.

04:02:37 13 And as it describes here, as the customers engage
04:02:39 14 in those devices, they increase their engagement with other
04:02:43 15 Amazon business that provides economic value.

04:02:46 16 And if we want to go ahead and pull up Plaintiff's
04:02:49 17 Exhibit 124, I'll show you an excerpt from the top of that
04:02:53 18 document where I pulled my portion of the excerpt.

04:02:56 19 It's actually -- yeah, that's it.

04:03:04 20 So you can read -- it's a few more words than I
04:03:09 21 put on -- on the slide page, but you can basically see
04:03:14 22 that's where this came from.

04:03:15 23 And you see they're mentioning things like DSI and
04:03:20 24 DEV in that heading. And you heard Mr. Caruccio talk about
04:03:23 25 downstream impact and talk about downstream economic value,

04:03:27 1 which are the profits I was talking about earlier.

04:03:29 2 If you want to pull back that document, you'll see
04:03:35 3 referenced a few more times in my slides. And I'll remind
04:03:38 4 you of that. But on my slide, if we go back to the
04:03:42 5 commercial factors profitability slide, on the bottom
04:03:48 6 there, I've also excerpted a few more terms that came up
04:03:52 7 frequently in the Amazon documents, including describing
04:03:55 8 these Echo devices as gateway heroes, sort of the gateway
04:04:00 9 to the rest of Amazon's ecosystem, the flywheel effect and
04:04:07 10 how that drives engagement.

04:04:11 11 And it ultimately leads to incremental spending by
04:04:11 12 customers and ultimately what they call the contribution
04:04:13 13 profits, which I'll talk about more in a second.

04:04:16 14 And it probably makes sense, if you want to, to go
04:04:18 15 ahead and pull up PTX-545, and I think there's a page there
04:04:22 16 that discusses the gateway, hero, and flywheel effect.

04:04:31 17 Yeah, the -- the terms get used multiple times in
04:04:34 18 these documents. But I'm just highlighting to you the --
04:04:38 19 I'm not making those things up. This is what Amazon
04:04:41 20 discusses.

04:04:41 21 And then if we want to briefly just pull up
04:04:44 22 PTX-125, it's another document that similarly talks about
04:04:48 23 the flywheel pretty extensively. Yeah, just showing you
04:04:55 24 the header of that one. All these documents in the
04:04:59 25 2018/2019 time frame when the patent issued and when this

04:05:03 1 case began.

04:05:03 2 THE COURT: Let's get back to specific questions
04:05:05 3 and answers.

04:05:07 4 Q. (By Mr. Lambrianakos) Mr. Ratliff, how does Amazon
04:05:15 5 determine profitability of its devices business?

04:05:18 6 A. So if we go to the next slide, again, you'll see that
04:05:21 7 same Plaintiff's Exhibit 124 reference that we already
04:05:24 8 pulled up. And you'll see that Amazon measures its device
04:05:30 9 business profitability using the device DEV. You heard
04:05:34 10 Mr. Caruccio discuss that. And in Amazon's document, it's
04:05:38 11 described as a lifetime present value for the device.

04:05:41 12 What Amazon does is, using information it's
04:05:43 13 gathered about spending of Echo customers versus non-Echo
04:05:51 14 customers, it's determined that increased profitability,
04:05:55 15 and it's determined that over the lifetime of the device,
04:05:57 16 which is approximately five years. And they've discounted
04:06:00 17 that back to the present to come up with an actual profit
04:06:04 18 that they include in their internal analyses and in their
04:06:08 19 decision-making.

04:06:13 20 They specifically include in that computation what
04:06:16 21 they call contribution profits.

04:06:18 22 Again, I know several of you have various business
04:06:21 23 backgrounds or have had your own businesses, so if I'm
04:06:25 24 saying stuff to you that's oversimplified, I apologize.
04:06:28 25 But just so that everyone is on the same page, you know, a

04:06:32 1 company makes sales, there's cost associated with those
04:06:36 2 products they sell. They call that cost of goods sold.
04:06:37 3 What's left is gross profit. Then they've got operating
04:06:40 4 expenses after that, and what's left is operating profit.

04:06:44 5 In between that gross profit and operating profit
04:06:46 6 is this concept of a contribution profit. It's basically
04:06:50 7 the revenues minus what we call variable costs. Every time
04:06:55 8 you sell a product, you incur that cost, whatever it is.
04:06:59 9 Compared to fixed cost, which you sort of already incurred
04:07:03 10 just to have a business.

04:07:06 11 So Amazon has identified these contribution
04:07:09 12 profits that they earn from incremental spending.
04:07:12 13 Remember, incremental means more than customers would
04:07:16 14 normally spend. Plus, they have additional monetization,
04:07:20 15 which they don't describe in great detail, we just know
04:07:23 16 it's there. And it's during that product's lifetime.

04:07:26 17 And, ultimately, they define this lifetime value
04:07:30 18 as the DEV. The DEV, again you heard Mr. Caruccio discuss
04:07:34 19 it, and you now heard me mention it. So it's that profit
04:07:37 20 per unit plus the actual profit per unit for the sale of
04:07:42 21 the device, or the loss on the sale of the device, as you
04:07:44 22 heard Ms. Daniels talk about and Mr. Caruccio talk about,
04:07:49 23 to keep the price really low on the device because they
04:07:51 24 know customers will buy them and then engage and earn
04:07:55 25 Amazon even more.

04:07:56 1 Q. Mr. Ratliff, were there any documents that you looked
04:07:59 2 at that describe how the device DEV is used by Amazon?

04:08:02 3 A. It's definitely used to drive decisions. This last
04:08:05 4 bullet point here points out that it's not just internal
04:08:11 5 data that they collect, but they actually then use it to
04:08:13 6 make decisions in their everyday business, whether what
04:08:16 7 they're going to invest in, how they're going to price
04:08:20 8 things, how they prioritize individual actions that they
04:08:23 9 have by consumers or recommend to consumers.

04:08:28 10 And if we want to pull up PTX-1071, we can see
04:08:34 11 that discussion. I think it's in the overview. Yeah,
04:08:36 12 there it is, at the top of the document.

04:08:38 13 So if you look at the first line, at the start of
04:08:40 14 that second sentence with "we use DEV to drive decisions,"
04:08:46 15 that's where this is coming from.

04:08:52 16 MR. LAMBRIANAKOS: At this time, Your Honor,
04:08:54 17 Amazon requested that the courtroom be sealed because we're
04:08:56 18 about to get into some of the proprietary financial metrics
04:08:59 19 of Amazon.

04:09:02 20 THE COURT: All right. Based on the request of
04:09:03 21 counsel, I'll order the courtroom sealed at this time.

04:09:07 22 If you're present and not subject to the
04:09:09 23 protective order that's been entered in this case, you
04:09:12 24 should excuse yourselves until the courtroom is unsealed
04:09:15 25 and reopened.

04:09:28 1 And, counsel, I'll rely on you to look around the
04:09:34 2 room and make sure everyone that needs to comply has
04:09:38 3 complied.

04:09:38 4 All right. The courtroom is sealed.

04:09:41 5 (Courtroom sealed.)

04:09:41 6 (This portion of the transcript is sealed
04:09:41 7 and filed under separate cover as
04:09:41 8 Sealed Portion No. 1.)

04:33:22 9 (Courtroom unsealed.)

04:33:22 10 THE COURT: Please during recess follow all the
04:33:25 11 instructions I've given you, including not to discuss the
04:33:28 12 case among yourselves. And we'll be back shortly to
04:33:33 13 continue with the Defendants' cross-examination of this
04:33:37 14 witness.

04:33:37 15 The jury is excused for recess at this time.

04:33:38 16 COURT SECURITY OFFICER: All rise.

04:33:39 17 (Jury out.)

04:33:40 18 THE COURT: Court stands in recess.

04:34:10 19 COURT SECURITY OFFICER: All rise.

04:34:11 20 (Jury out.)

04:34:11 21 (Recess.)

04:34:11 22 COURT SECURITY OFFICER: All rise.

04:34:12 23 THE COURT: Be seated, please.

04:44:59 24 Mr. Dacus, if you're going to cross-examine this
04:45:02 25 witness, you may go to the podium and prepare.

04:45:04 1 MR. DACUS: Thank you.

04:45:05 2 THE COURT: Are there binders to pass out?

04:45:10 3 MR. DACUS: There are, Your Honor. Thank you.

04:45:14 4 THE COURT: While they're doing that, let's bring
04:45:15 5 in the jury, please, Mr. Mixon.

04:45:19 6 COURT SECURITY OFFICER: All rise.

04:45:21 7 (Jury in.)

04:45:34 8 THE COURT: Please be seated.

04:45:47 9 All right. Mr. Dacus, you may proceed with
04:45:57 10 cross-examination.

04:45:57 11 MR. DACUS: Thank you, Your Honor.

04:45:57 12 CROSS-EXAMINATION

04:45:58 13 BY MR. DACUS:

04:45:58 14 Q. Good afternoon, Mr. Ratliff.

04:46:00 15 A. Good afternoon.

04:46:00 16 Q. You're not here, sir, to tell this jury whether or not
04:46:05 17 Amazon infringes, correct?

04:46:06 18 A. Correct.

04:46:06 19 Q. Not here to tell this jury whether or not this patent
04:46:09 20 is valid, correct?

04:46:10 21 A. Correct.

04:46:10 22 Q. And, indeed, if this jury finds that, in fact, Amazon
04:46:16 23 does not infringe, that is, does not use this patent, then
04:46:19 24 damages are zero, correct?

04:46:21 25 A. Correct.

04:46:21 1 Q. Likewise, if the jury were to find that the patent is
04:46:26 2 invalid, then damages are zero, correct?

04:46:27 3 A. Correct.

04:46:28 4 Q. And if I understood you, in your calculation, you
04:46:31 5 assumed both that there was infringement and that the
04:46:35 6 patent was valid, fair?

04:46:36 7 A. That's correct.

04:46:37 8 Q. You understand that the reason I'm up here asking you
04:46:41 9 questions about damages, even though Amazon says it doesn't
04:46:45 10 owe Vocalife anything, is because we have an obligation to
04:46:48 11 provide the jury with all the evidence related to damages,
04:46:54 12 you understand that, correct?

04:46:55 13 A. That's a fair summary of the Rule, yes.

04:46:58 14 Q. Okay. Now, you are being paid for your testimony here
04:47:01 15 today, correct?

04:47:02 16 A. I'm paid for my time, but not for my opinions.

04:47:06 17 Q. You've been paid for the work that you did?

04:47:08 18 A. That's correct.

04:47:09 19 Q. And at what rate? What hourly rate?

04:47:11 20 A. Me personally, 695 an hour. For my team as a whole,
04:47:16 21 the average rate is about \$300.00 an hour.

04:47:19 22 Q. So \$695.00 an hour, correct?

04:47:21 23 A. For my hours only.

04:47:22 24 Q. And you mentioned earlier that you had three other
04:47:25 25 people working with you to develop your opinions in this

04:47:27 1 case, correct?

04:47:29 2 A. Yes.

04:47:29 3 Q. It's fair to say that those three people combined did
04:47:33 4 more work -- spent more hours than you did, fair?

04:47:37 5 A. Yes, that's how it is normally.

04:47:39 6 Q. So it's fair to say that the people who did the
04:47:43 7 majority of the work on this file and in reaching these
04:47:47 8 opinions are not here testifying, true?

04:47:49 9 A. That's correct. They do work, I review their work, and
04:47:52 10 then we put together the report.

04:47:54 11 Q. Now, you understand, sir, that the claims, Claims 1 and
04:47:58 12 8, of the '049 patent that are asserted here, are what we
04:48:03 13 call method claims, correct?

04:48:05 14 A. Yes.

04:48:05 15 Q. And you understand, as Mr. McAlexander explained today,
04:48:09 16 that if any infringement occurred, it occurred by a
04:48:12 17 consumer or a user speaking to the Echo device, correct?

04:48:20 18 A. I believe that is an example of infringement. I don't
04:48:25 19 know if it's the only infringement. And I'm not offering
04:48:28 20 that testimony one way or the other.

04:48:30 21 Q. You heard Mr. McAlexander say earlier that infringement
04:48:33 22 is a user saying the wake word to the Echo device? You
04:48:39 23 were here for that, correct?

04:48:40 24 A. I understand that's an example of infringement, yes.

04:48:43 25 Q. And -- and you agree, sir, that the law allows for what

04:48:50 1 you said earlier is a reasonable royalty, correct?

04:48:53 2 A. Yes.

04:48:53 3 Q. And so, ultimately, what this jury needs to determine,
04:48:56 4 if they -- if they get this far, is whether or not the
04:48:59 5 money that you've asked for under a reasonable royalty is,
04:49:02 6 in fact, reasonable. Fair?

04:49:02 7 A. Yes.

04:49:06 8 Q. And you agree that Vocalife has the burden of proof on
04:49:11 9 damages, true?

04:49:12 10 A. Yes.

04:49:18 11 Q. Now, many products, including this Echo device and the
04:49:21 12 Alexa voice system, contain multiple or many components or
04:49:27 13 features, fair?

04:49:29 14 A. Yes.

04:49:29 15 Q. In determining a royalty, what you are required to do
04:49:32 16 is to only value the specific patented features and not all
04:49:35 17 those other features, fair?

04:49:37 18 A. Yes.

04:49:38 19 Q. And you know here that between the Echo and the Alexa,
04:49:40 20 there are at least hundreds, if not thousands, of other
04:49:44 21 features, true?

04:49:45 22 A. Again, my focus was the Echo device. Anything related
04:49:52 23 to a broader platform would have been included in the
04:49:54 24 technology that I discussed in my first portion. So, yes,
04:50:00 25 I understand it's narrowed down to specific features of the

04:50:04 1 accused device.

04:50:05 2 Q. Things like speech recognition, automatic speech
04:50:10 3 recognition, artificial intelligence through natural
04:50:15 4 language understanding, those things that Alexa does that
04:50:18 5 allows items to be ordered over Amazon.com, you agree those
04:50:23 6 have nothing to do with the patent, correct?

04:50:25 7 A. That's my understanding. That was part of the
04:50:28 8 technology that I excluded from my computation, yes.

04:50:31 9 Q. Well, you -- let's start at a high level.

04:50:34 10 You agree you should exclude those from your
04:50:36 11 computation, correct?

04:50:37 12 A. Yes.

04:50:38 13 Q. And -- you agree, sir, that the only thing that you
04:50:45 14 should be valuing for purposes of a royalty calculation are
04:50:48 15 those parts of the patent that are new; isn't that true?

04:50:52 16 A. I'm supposed to value the invention, which would be the
04:51:03 17 improvement over prior art. I don't know that I -- the
04:51:08 18 word "new" is not something I would necessarily use that
04:51:12 19 word. I'm valuing the invention.

04:51:14 20 Q. Let -- let me phrase it differently.

04:51:16 21 When you say you should not value the prior art,
04:51:21 22 in other words, things that were known before this patent,
04:51:24 23 you should not be attributing value to those in the process
04:51:27 24 of your royalty calculation, correct?

04:51:30 25 A. Again, I'm going to stick with my understanding, which

04:51:36 1 is the invention. If there's an improvement on prior art,
04:51:38 2 then it can be a little bit of a gray area. There's prior
04:51:44 3 art there, but there's improvement. The invention is what
04:51:46 4 I mean by the improvement.

04:51:49 5 Q. If I understood what you told this jury, is part of the
04:51:53 6 process is to envision that there's this hypothetical
04:51:56 7 negotiation that occurred between Amazon and Vocalife,
04:51:59 8 correct?

04:51:59 9 A. Yes.

04:51:59 10 Q. In other words, we're supposed to -- and the jury's
04:52:03 11 supposed to imagine that the two parties sat down at this
04:52:06 12 table and negotiated a license. Fair?

04:52:07 13 A. Yes.

04:52:08 14 Q. And in the course of that negotiation, both you and the
04:52:15 15 jury have to assume that the parties had full disclosure of
04:52:19 16 information about each other; isn't that true?

04:52:23 17 A. Yes, that's a general premise of the hypothetical is
04:52:27 18 anything that could be known was known.

04:52:31 19 Q. In other words, in assessing the reasonable royalty
04:52:34 20 here, Amazon doesn't get to hide anything from Vocalife,
04:52:38 21 and Vocalife doesn't get to hide anything from Amazon? We
04:52:41 22 assume that all the cards are on the table, both have full
04:52:44 23 information about each other, true?

04:52:45 24 A. Yes. Sometimes there are things that are simply not
04:52:49 25 known. But, yes, to the extent it's known, that's my

04:52:52 1 understanding.

04:52:52 2 Q. So one thing Vocalife would know is that these Amazon
04:52:55 3 Echo devices are only one way that items are purchased from
04:53:01 4 Amazon.com, correct?

04:53:03 5 A. Yes.

04:53:06 6 Q. In other words, you can buy things from Amazon through
04:53:10 7 your computer, correct?

04:53:12 8 A. Yes.

04:53:12 9 Q. You can buy things from Amazon through your smartphone,
04:53:16 10 correct?

04:53:16 11 A. Yes.

04:53:16 12 Q. You can even buy things from Amazon through this thing
04:53:22 13 called a FireTV stick that streams video to your
04:53:26 14 television, correct?

04:53:27 15 A. Correct.

04:53:27 16 Q. None of those things are accused of infringement,
04:53:30 17 correct?

04:53:30 18 A. As far as I know, that's correct. I didn't assume that
04:53:34 19 any of those were.

04:53:40 20 Q. Okay. Now, Amazon would know about Vocalife, that, in
04:53:44 21 fact, Vocalife has never licensed the '049 patent, correct?

04:53:47 22 A. Correct.

04:53:47 23 Q. Never licensed the '756 patent, correct?

04:53:51 24 A. My focus was the '049.

04:53:55 25 Q. You --

04:53:55 1 A. So I don't really know about other licensing activity
04:53:58 2 that may or may not have happened, but the '049 was never
04:54:01 3 licensed. I know that.

04:54:03 4 Q. You know for a fact that Dr. Li has been out shopping
04:54:09 5 his technology to many other companies, dozens of other
04:54:13 6 companies, and not -- not a one of them has ever taken a
04:54:16 7 license to his technology, correct?

04:54:17 8 A. Again, if he made those statements on his direct, I
04:54:25 9 don't specifically recall it.

04:54:30 10 Q. You know that Vocalife claims that the '049 has -- has
04:54:34 11 many applications beyond application in an Echo device,
04:54:39 12 correct?

04:54:39 13 A. That's my general understanding, yes.

04:54:42 14 Q. You heard Mr. McAlexander at least make that claim --

04:54:46 15 A. Yes.

04:54:46 16 Q. -- correct?

04:54:47 17 And despite the fact that there are many
04:54:49 18 applications, not a single company has ever taken a license
04:54:52 19 to the '049 patent, have they, sir?

04:54:54 20 A. That's pretty typically what I encounter with smaller
04:54:59 21 companies have a difficulty getting parties to license.
04:55:01 22 That doesn't mean they don't infringe.

04:55:03 23 Q. Amazon would know that Vocalife that had this
04:55:12 24 VoiceFocus phone in the past, was never able to have an
04:55:15 25 operational product, correct?

04:55:17 1 A. That would be one of the facts that would be known is
04:55:22 2 whatever the operations were of Vocalife.

04:55:24 3 Q. And you -- you've seen this product that Vocalife has
04:55:27 4 now called this CrispMic? Have you seen that?

04:55:31 5 A. I've seen diagrams and -- and pictures, yes.

04:55:34 6 Q. And one of the things that Amazon would know at this
04:55:39 7 negotiation is that this CrispMic that Vocalife has
04:55:44 8 developed came out in 2018, correct?

04:55:48 9 A. I don't know the year, no. I don't know one way or the
04:55:50 10 other.

04:55:51 11 Q. Okay. Have you been here for all the trial,
04:55:53 12 Mr. Ratliff?

04:55:54 13 A. I have. I -- I read the transcript for Thursday
04:55:57 14 afternoon, and then I've been here for Friday and today.
04:56:00 15 But these are background things that weren't directly
04:56:05 16 relevant to damages.

04:56:06 17 Q. One of the things that Amazon would know is that this
04:56:10 18 CrispMic product that came out in 2018 came out some four
04:56:15 19 years after the Amazon Echo, correct?

04:56:18 20 A. Again, I don't know the 2018 for sure, but if you're
04:56:22 21 representing that's the evidence, then 2018 is four years
04:56:26 22 after 2014.

04:56:28 23 Q. Well, Mr. Re questioned Dr. Zhu about this very issue,
04:56:33 24 and she talked to him about the fact -- I mean, talked to
04:56:36 25 Dr. Li about the fact that that CrispMic came out in 2018,

04:56:41 1 and, indeed, the patent itself came out in 2018, correct?

04:56:45 2 A. The '049 patent came out in 2018, yes.

04:56:48 3 Q. Some four years after the Echo product?

04:56:51 4 A. Yes.

04:56:59 5 MR. DACUS: Your Honor, at this point, I think I'm
04:57:01 6 going to need to go into some financial information that we
04:57:06 7 would, under the Court's procedures, need to seal the
04:57:08 8 courtroom for. If I can ask the Court to please seal the
04:57:11 9 courtroom.

04:57:11 10 THE COURT: All right. Based on counsel's request
04:57:13 11 and an indication that he's about to go into confidential
04:57:16 12 information, I'll order the courtroom sealed at this time.

04:57:18 13 Those of you present, not subject to the
04:57:21 14 protective order, should excuse yourselves and remain
04:57:23 15 outside the courtroom until the courtroom is unsealed and
04:57:26 16 reopened.

04:57:27 17 (Courtroom sealed.)

04:57:27 18 (This portion of the transcript is sealed
04:57:27 19 and filed under separate cover as
04:57:28 20 Sealed Portion No. 2.)

05:38:20 21 (Courtroom unsealed.)

05:38:28 22 THE COURT: Ladies and gentlemen, we're at a point
05:38:30 23 where I will ask the Plaintiff who their next witness is.

05:38:34 24 MR. FABRICANT: Your Honor, subject to the
05:38:36 25 admission and receipt into evidence of the pre-admitted

05:38:40 1 exhibits which were used in court today, the Plaintiff
05:38:44 2 rests its case.

05:38:46 3 THE COURT: All right. The Plaintiff having
05:38:49 4 rested its case-in-chief, we are at a point where it's
05:38:55 5 appropriate to begin with the Defendants' case-in-chief but
05:39:00 6 not this late in the day.

05:39:01 7 We will recess for the evening at this time. I'm
05:39:04 8 going to ask each of the members of the jury to be sure
05:39:07 9 that they take their juror notebooks into the jury room,
05:39:10 10 leave them closed on the table.

05:39:14 11 Please be prepared to return tomorrow so that we
05:39:18 12 can start as close to 8:30 as possible. Please be in the
05:39:22 13 jury room and assembled before 8:30.

05:39:26 14 Please follow all the instructions I've given you
05:39:28 15 about your conduct throughout the entirety of the trial,
05:39:33 16 including, of course, that you not discuss the case with
05:39:36 17 anyone, including the eight of yourselves.

05:39:39 18 Please travel safely to your homes, ladies and
05:39:42 19 gentlemen. Be careful on the road. And I will see you
05:39:44 20 tomorrow.

05:39:45 21 The jury is excused at this time.

05:39:47 22 COURT SECURITY OFFICER: All rise.

05:39:49 23 (Jury out.)

05:39:49 24 THE COURT: Be seated, please.

05:40:14 25 Let me remind you, counsel, of my earlier

05:40:20 1 directive that you jointly meet and confer and submit to
05:40:24 2 the Court a jointly-proposed and amended and updated final
05:40:30 3 jury instruction and verdict form by 3:00 o'clock tomorrow.

05:40:34 4 In those areas where you may not agree, in fact,
05:40:38 5 where -- in those areas where you do disagree, submit your
05:40:42 6 competing proposals in succession with either a different
05:40:47 7 font or some clear indicator as which comes from which
05:40:50 8 party and which comes from the other. Be sure that those
05:40:52 9 are transmitted to the Court in Word format. And, again,
05:40:56 10 I'll look for those not later than 3:00 o'clock tomorrow.

05:40:58 11 Are there questions from either Plaintiff or
05:41:00 12 Defendant before we recess for the evening?

05:41:03 13 MS. TRUELOVE: Nothing from Plaintiff, Your Honor.

05:41:04 14 MR. DACUS: Nothing from Amazon, Your Honor.

05:41:06 15 THE COURT: All right. I will be in chambers, if
05:41:08 16 needed. Otherwise, I will see you in the morning. I'll be
05:41:11 17 in chambers in the morning, if needed, and whether you need
05:41:14 18 me or not, we will start as close to 8:30 as possible.

05:41:17 19 MS. TRUELOVE: Your Honor, if I could, I had a
05:41:19 20 paralegal whispering in my ear. Does the Court have our
05:41:23 21 time used at this point?

05:41:25 22 THE COURT: I can give you that or very close
05:41:28 23 approximation, Ms. Truelove.

05:41:29 24 MS. TRUELOVE: Thank you.

05:41:30 25 THE COURT: As of now, my calculations are that

05:41:34 1 the Plaintiff has used 9 hours and 41 minutes and has 3
05:41:38 2 hours and 19 minutes remaining.

05:41:40 3 The Defendant has used 6 hours and 18 minutes and
05:41:46 4 has 6 hours and 42 minutes remaining.

05:41:52 5 MS. TRUELOVE: Thank you, Your Honor.

05:41:52 6 THE COURT: Anything further from either Plaintiff
05:41:54 7 or Defendant?

05:41:54 8 MR. DACUS: No, Your Honor.

05:41:55 9 MS. TRUELOVE: No, Your Honor.

05:41:56 10 THE COURT: We stand in recess until tomorrow
05:41:58 11 morning.

05:41:59 12 COURT SECURITY OFFICER: All rise.

05:41:59 13 (Recess.)

14

15 CERTIFICATION

16

17 I HEREBY CERTIFY that the foregoing is a true and
18 correct transcript from the stenographic notes of the
19 proceedings in the above-entitled matter to the best of my
20 ability.

21

22 /S/ Shelly Holmes
23 SHELLY HOLMES, CSR, TCRR
24 OFFICIAL REPORTER
State of Texas No.: 7804
Expiration Date: 12/31/2020

10/5/2020
Date

25